

...Upfront

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The 1990's: A Dynamic Decade for the U.S. Food System

Consumers in the 1990's demanded quick, easy-to-prepare grocery foods to match their fast-paced lifestyles. And, the rising incomes of the second half of the decade allowed consumers to pay for these convenience foods and for more away-from-home eating. The proportion of the food dollar spent eating out grew from 44 percent in 1990 to 47.5 percent in 1999. This demand for convenience translated into higher labor, packaging, energy, and other food marketing costs. Between 1990 and 1999, marketing costs rose 45 percent and accounted for most of the 37-percent rise in domestic consumer food spending.

The increasing prosperity of the 1990's is reflected in declining participation and expenditures for some domestic food assistance programs. Led by the Food Stamp Program, overall food and nutrition assistance expenditures grew by over 50 percent between 1990 and 1996. But beginning in 1997, expenditures began falling. By fiscal 1999, total expenditures for Federal food and nutrition assistance programs stood at \$32.9 billion—14 percent below 1996's peak.

The 1990's was a dynamic decade for food safety. In 1996, USDA issued new rules and testing procedures for meat and poultry processors to reduce disease-causing pathogens. All federally inspected meat and poultry plants had to adopt Hazard Analysis and Critical Control Points (HACCP) plans for identifying food safety hazards, establishing ways to reduce or eliminate the hazards, and verifying the controls were successful. The U.S. Food and Drug Administration initiated a HACCP program in 1995 for seafood processors and proposed HACCP procedures for fruit and vegetable juices in 1998. During the 1990's, the Government also launched several national campaigns aimed at educating retailers, foodservice operators, and consumers on safe ways to store and prepare food.

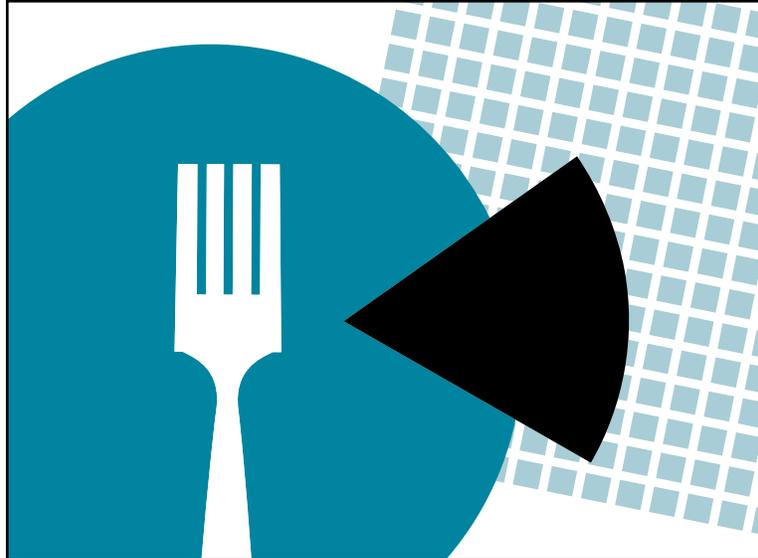
It was a dynamic decade for nutrition as well. With the Nutrition Labeling and Education Act, implemented in 1994, consumers had a wealth of nutrition information on food packages allowing quick and easy in-store comparisons between foods. Food manufacturers raced to offer low-fat or "lite" versions of popular food products. In 1996, 2,076 new food products claimed to be reduced in fat or fat-free—nearly 16 percent of all new food products introduced that year. As the decade ended, fat-phobia seemed to have cooled some, replaced by interest in fiber, calcium, folate, and other disease-fighting nutrients. During the 1990's, meals served as part of government-supported feeding programs were revamped to comply with the *Dietary Guidelines for Americans*. And, the 1992 Food Guide Pyramid proved to be a popular graphic for helping consumers translate the *Dietary Guidelines* into food choices.

Unfortunately, much of the Government's dietary advice appears to be getting lost in the translation. Analyses of food supply data, adjusted for spoilage and waste, by USDA's Economic Research Service find the average American diet unbalanced when compared with the recommended servings from the Food Guide Pyramid. Our food choices reflect a topsy-turvy pyramid, top heavy with added sugars and fats and light on whole grains, fruits, and dairy products. No wonder many of us ended the decade heavier than we started.

Rosanna Mentzer Morrison
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P.S. In Recent Reports from USDA's Economic Research Service at the end of this issue, you'll find summaries and ordering information for food-related reports released over the last year.

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Per Capita Food Supply Trends: Progress Toward Dietary Guidelines

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Federal dietary guidance outlined in the 2000 edition of *Dietary Guidelines for Americans* and depicted in the Food Guide Pyramid is intended to help consumers choose diets that improve health, reduce their risk for diet-related chronic disease, and meet their nutritional needs (fig. 1). The Food Guide Pyramid helps consumers put the *Dietary Guidelines* into practice by recommending the type and quantity of foods to eat from five major food groups—grains (bread, cereals, rice, and pasta), vegetables, fruit, dairy (milk, yogurt, and cheese), and meat (red meat, poultry, fish, dry beans, eggs, and nuts). The Pyramid also suggests that consumers use fats, oils, and sweets sparingly. *The Dietary Guidelines* recommend that Americans limit total fat intake to no more than 30 percent of calories, saturated fat intake to less than 10 percent of calories, and dietary cholesterol to less than the Daily Value of 300 milligrams a day listed on the Nutrition Facts Label.

Information about consumers' eating patterns, if different from these recommendations, helps consumers make dietary adjustments and helps policymakers and nutrition educators target educational

messages effectively. For example, analyses of food supply data, adjusted for spoilage and waste, by USDA's Economic Research Service (ERS) suggest that the average American diet is heavily weighted to added fats and sugars found at the tip of the Pyramid and falls short of recommendations for fruits and dairy products. And many consumers need to change the mix of foods in the meat, vegetable, and grain groups to meet recommendations for dietary variety and selected food components, such as fiber, total fat, saturated fat, and cholesterol.

Food Supply Data Adjusted for Spoilage and Waste

Two primary data sets are available to measure compliance with the new *Dietary Guidelines*—USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and the U.S. Food Supply Series. Both data sets provide Pyramid servings data for analyzing how American diets stack up compared to Pyramid recommendations.

The CSFII records what people say they have eaten over a specific time period and collects demographic information about respondents, such as household size, income, race, age, and sex. The demographic information is particularly valuable because it can be used

Figure 1
Dietary Guidelines for Americans

AIM FOR FITNESS...

- ▲ Aim for a healthy weight.
- ▲ Be physically active each day.

BUILD A HEALTHY BASE...

- Let the Pyramid guide your food choices.
- Choose a variety of grains daily, especially whole grains.
- Choose a variety of fruits and vegetables daily.
- Keep food safe to eat.

CHOOSE SENSIBLY...

- Choose a diet that is low in saturated fat and cholesterol and moderate in total fat.
- Choose beverages and foods to moderate your intake of sugars.
- Choose and prepare foods with less salt.
- If you drink alcoholic beverages, do so in moderation.

The *Dietary Guidelines* are issued by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS) and are updated every 5 years to reflect new scientific findings and changes in food consumption and physical activity levels of the population. The *Dietary Guidelines for Americans* released in April 2000 is the fifth edition.

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to identify the type of persons most likely to meet dietary recommendations on the basis of social and demographic characteristics and can help researchers assess dietary status among population subgroups. The 1994-96 CSFII Pyramid Servings Data provide national probability estimates for the U.S. population based on food intakes reported by 14,256 individuals 2 years of age and older on 2 nonconsecutive days.

Numerous studies suggest that food intake surveys, like the CSFII, which collect food consumption data through recollections of foods eaten or food diaries over short periods, are subject to underreporting of consumption when measured in terms of energy intake. Underreporting of consumption is a particular concern of researchers studying the underlying causes of the steep rise in the prevalence of obesity in recent years in the United States.

Food supply data are collected directly from producers and distributors using techniques that vary by commodity. Food supply data are not collected from individual consumers, which allows examination of food consumption changes independent of consumer survey data. If waste and other losses in the system are relatively constant from year to year, food supply data also provide an independent measure of changes in food consumption patterns over time.

ERS calculates annually the amount of food available for human consumption in the United States. For most commodity categories, this available food supply is measured as the sum of annual production, beginning inventories, and imports minus exports, industrial nonfood uses, farm uses (seed and feed), and end-of-year inventories. Per capita consumption is calculated by dividing the available food supply by the total U.S. population as of July 1 each year.

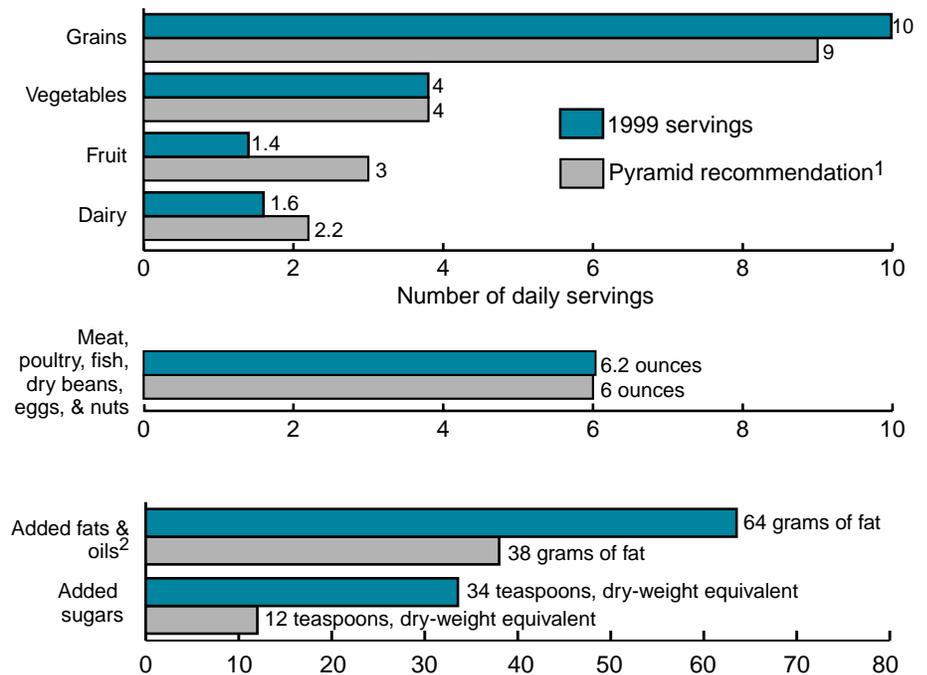
Since food supplies are measured on an aggregate level as they move through marketing channels for domestic consumption, the data typically overstate the amount of food that people actually ingest by capturing substantial quantities of nonedible food parts (like peach pits) and food lost through spoilage and waste in the home and marketing systems.

ERS has developed new methods to adjust the food supply data for losses and express the data in terms of servings recommended by the Food Guide Pyramid. Researchers can gain a more complete understanding of U.S. dietary patterns by comparing food supply servings at the national level with estimates generated at the individual level by food intake surveys. Loss-adjusted

servings calculated from the food supply data can be compared with the servings recommended by the Food Guide Pyramid to gauge America's progress in following the new *Dietary Guidelines* (fig. 2).

The Pyramid shows a range of servings for each major food group. The number of servings varies depending on a person's age, sex, and physiological status. Everyone should have at least the lowest number of servings in the food group ranges. Preschool children, 2-3 years of age, should eat smaller servings (two-thirds of the adult servings, except milk) of the lowest calorie level. ERS uses the recommended Pyramid servings for a sample diet of 2,200 calories in this article. This calorie level approximates the daily Recommended

Figure 2
1999 Food Supply Servings Compared With Food Guide Pyramid Serving Recommendations



¹Pyramid recommendation based on a sample diet of 2,200 calories.

²The Food Guide Pyramid does not make a recommendation for added fats and oils. This recommendation is implied by the 52-percent share of total fats accounted for by added fats and oils in the food supply in 1997 and an upper limit on total fat consumption of 73 grams for a 2,200-calorie diet.

Source: USDA's Economic Research Service.

Energy Allowance (REA) of 2,247 calories for the United States, derived from a 1998 population-weighted average of REA's for different cohorts of the U.S. population.

Red Meat Dominates the Meat Group

In 1999, total meat consumption (red meat, poultry, fish, and shellfish) amounted to 201 pounds (boneless, trimmed-weight equivalent,

unadjusted for waste and cooking losses) per person, 24 pounds above the 1970's annual average (table 1). Each American consumed an average of 12 pounds less red meat (mostly less beef), 33 pounds more poultry, and 3 pounds more fish and shellfish, compared with average annual consumption in the 1970's.

The Dietary Guidelines and the Food Guide Pyramid recommend two to three servings (totaling the equivalent of 5 to 7 ounces of

cooked lean meat) of fish, shellfish, lean poultry, other lean meats, eggs, beans, or nuts daily. *The Dietary Guidelines* suggest choosing beans often, trimming fat from meat, skinning poultry, and limiting intake of organ meats, egg yolks, and high-fat processed meats, such as bacon, sausages, and cold cuts, to keep saturated fat intake and blood cholesterol in check. *The Dietary Guidelines* also advise eating moderate amounts of foods high in unsaturated fats—some fish, such as

Table 1
Americans Are Eating Less Red Meat, Fewer Eggs, and More Poultry and Fish

Item	Per capita annual averages				Change, 1970-79 to 1999	1999 food supply, Pyramid-based servings per capita per day ¹
	1970-79	1980-89	1990-99	1999		
	<i>Pounds, edible weight²</i>				<i>Percent</i>	<i>Ounces of cooked meat equivalents</i>
Total meat, poultry, and fish	177.2	182.2	191.1	201.3	13	5.2
Red meat	129.5	121.8	113.7	117.7	-9	3.0
Beef	80.9	71.7	63.9	65.8	-19	1.8
Pork	45.0	47.7	48.1	50.5	12	1.2
Lamb and mutton	1.5	1.0	.9	.9	-40	—
Veal	2.0	1.3	.8	.6	-70	—
Poultry	35.2	46.2	62.6	68.3	94	1.7
Chicken	28.4	36.3	48.5	54.2	91	1.3
Turkey	6.8	9.9	14.1	14.1	107	.4
Fish and shellfish	12.5	14.2	14.8	15.2	18	.5
Dry beans, peas, and lentils (legumes) ³	7.0	6.6	8.1	8.4	20	.2
Peanuts and peanut butter	5.8	6.1	6.0	6.1	5	.1
Tree nuts and coconuts	2.3	2.6	2.7	2.7	21	.1
	<i>Number</i>					
Eggs	285.4	256.6	238.7	254.6	-11	.6
In-shell	251.6	218.3	178.6	181.1	-28	.4
Processed	33.8	38.3	60.1	73.5	118	.2
	<i>Ounces of cooked meat equivalents daily¹</i>					
Total meat group supply ^{1, 3}	5.7	5.7	5.9	6.2	9	6.2

The Food Guide Pyramid bulletin recommends that average meat group consumption should total the equivalent of 6 ounces of cooked lean meat per person per day for a 2,200-calorie diet, and that legumes should be selected often as choices from the meat group.

— = Less than 0.05. Note: Totals may not add due to rounding.

¹Adjusted for waste and cooking losses. According to the Food Guide Bulletin, consumers should count meat, poultry, and fish in total ounces. Other foods in this group—1 egg, 1/2 cup dry beans, 2 tablespoons of peanut butter, and 1/3 cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat.

²Aggregate data, unadjusted for waste and cooking losses.

³Includes all legumes consumed, including those that may have been selected as vegetable group servings.

Source: USDA's Economic Research Service.

salmon, tuna, and mackerel, and many kinds of nuts—taking care to avoid excess calories. The 2000 edition of the *Dietary Guidelines* states: “Get most of your calories from plant foods (grains, fruits, vegetables). If you eat foods high in saturated fat for a special occasion, return to foods that are low in saturated fat the next day.”

For a 2,200-calorie diet, the recommended amount from the meat group is the equivalent of 6 ounces of cooked lean meat per person per day. Meat, poultry, and fish are counted in total ounces. Other foods in this group—1 egg, 1/2 cup of dry beans, 1/2 cup of tofu, a 2-1/2-ounce soyburger, 2 tablespoons of peanut butter, or 1/3 cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat.

After adjusting for waste and cooking losses, the food supply provided the equivalent of 6.2 ounces of cooked meat (lean and fat portion) per person per day in 1999—a modest 9-percent increase from the 1970’s. Because food supply estimates for meat and poultry include both lean and fat, the estimates likely overstate lean meat consumption and are not directly comparable with the Food Guide Pyramid recommendation.

Legumes (dry beans, peas, or lentils) count either as servings in the meat or the vegetable group. As a vegetable, 1/2 cup of cooked, dry beans counts as one serving. As a meat substitute, one cup of cooked, dry beans counts as one serving (equivalent to 2 ounces of cooked lean meat). The 2000 edition of the *Dietary Guidelines* advises consumers to choose legumes often as vegetable servings and as protein sources from the meat group. Previous dietary assessment research has implied that “often” equals about one-seventh of total vegetable servings, or about four 1/2-cup servings a week for a 2,200-calorie diet. For

this analysis, we also defined “often” as equal to one-seventh of total meat group servings, or about three 1-cup servings a week for a 2,200-calorie diet. Thus, average consumption of cooked legumes should total 5 cups per week. However, total legume servings in 1999—less than 3/4 cup of cooked legumes weekly a person—fell far short of this level.

Although poultry meat consumption nearly doubled since the 1970’s, red meat accounted for 49 percent of total meat-group servings per capita per day in 1999, nearly double the 27-percent poultry share. The remaining 24 percent broke down as follows: fish and shellfish, 7 percent; eggs, 10 percent; dry beans, peas, and lentils, 4 percent; peanuts and peanut butter, 2 percent; and tree nuts and coconuts, 1 percent. (The food supply series does not estimate consumption of soy products—soyburgers, tofu—other than soybean oil.) The data suggest that, on average, Americans consume large quantities of foods that, relative to others in the meat group, are naturally high in saturated fat, and cholesterol. Many consumers may need to adjust the mix of foods they eat in this group.

Cheese Accounts for Over Two-Fifths of Total Dairy Servings

Dairy products accounted for nearly three-quarters of the calcium available in the U.S. food supply in 1997 (72 percent). Calcium is essential to form strong bones and teeth, and requirements increase significantly during adolescence, early adulthood, pregnancy, and lactation. Therefore, the *Dietary Guidelines* base milk serving recommendations on age and physiology rather than energy requirements alone among the food groups. Three daily servings—the equivalent of three 8-ounce glasses of milk per day—are

suggested for teenagers, young adults up to 24 years of age, and pregnant and lactating women. All others should have two daily servings.

In this study, food supply servings were measured against a daily recommended intake of 2.2 servings. This target was based on a weighted average of recommended servings for different age groups of the U.S. population (excluding the higher needs of pregnant and lactating women). The food supply provided 1.6 daily servings of dairy products in 1999, about three-quarters of the 2.2 servings target, which is essentially unchanged since 1970 (table 2).

A modest increase in consumption, equal to about one-half cup of milk per person daily, would bring per capita servings up to Pyramid recommendations. Because many dairy foods are naturally high in fat, consumers may need to weigh their increased consumption of dairy products against overall fat intake. In 1999, for example, more than half the dairy servings provided by the food supply came from two dairy products naturally high in fat—cheese and whole milk.

Sharp changes over time in consumption patterns for fluid milk and cheese also suggest that many consumers may be substituting one high-fat dairy food for another, with little net reduction in total dairy-fat intake. Between 1970-79 and 1999, for example, Americans reduced their average annual consumption of plain whole milk by three-fifths to 8 gallons per person. Consumption of plain low-fat (1-percent) and skim milk nearly tripled during this same period, but consumption is still relatively low at 6.4 gallons per person in 1999. Consumption of plain reduced-fat (2-percent) milk increased 60 percent to 7.5 gallons per person in 1999.

Even as Americans used less whole milk, they boosted their

Table 2
Americans Are Drinking Less Milk and Eating More Cheese and Yogurt

Item	Per capita annual averages				Change, 1970-79 to 1999	1999 food supply, Pyramid-based servings per capita per day ¹
	1970-79	1980-89	1990-99	1999		
	<i>Gallons²</i>				<i>Percent</i>	<i>Number</i>
Beverage milk	29.8	26.5	24.6	23.6	-21	.70
Plain	28.1	24.9	23.1	22.0	-22	.66
Whole	20.9	13.9	8.8	8.0	-62	.24
2-percent fat	4.7	7.7	8.5	7.5	60	.23
1-percent fat	1.0	1.8	2.5	2.6	160	.08
Skim	1.4	1.5	3.4	3.8	171	.12
Flavored	1.2	1.1	1.2	1.4	15	.04
Buttermilk	.6	.5	.3	.3	-50	.01
	<i>Half-pints²</i>					
Yogurt	3.2	6.5	8.5	9.1	184	.03
	<i>Pounds²</i>					
Total cheese (excluding cream cheese) ³	18.6	24.3	27.8	30.2	76	.68
Cheese other than cottage-types ^{3,4}	13.7	20.2	24.9	27.5	107	.67
Natural cheese	9.3	15.3	20.1	22.9	146	.54
Cheddar	6.3	9.0	9.3	10.1	60	.20
Mozzarella	2.0	4.5	8.0	9.2	360	.18
Cheese content of processed cheese products ⁵	4.3	5.0	4.8	4.6	6	.13
Cottage cheese	4.9	4.1	2.9	2.7	-45	.01
Frozen dairy products ⁶	27.8	27.4	29.1	29.3	5	.09
Ice cream	17.7	17.7	16.1	16.8	-5	.06
Low-fat ice cream	7.6	7.2	7.6	7.9	4	.03
Sherbet	1.5	1.3	1.3	1.3	-9	.00
Frozen yogurt	na	na	2.9	2.1	na	.01
Condensed and evaporated milks	9.4	7.5	7.5	6.6	-30	.04
Dry milks	4.1	2.4	3.1	3.6	-12	.10
	<i>Number of daily servings¹</i>					
Total dairy group supply ¹	1.6	1.6	1.6	1.6	4	1.64

The Food Guide Pyramid bulletin suggests three servings—the equivalent of three 8-ounce glasses of milk per day—for teenagers, young adults up to 24 years of age, and pregnant and lactating women. Two daily servings of dairy foods are recommended for children and most other adults. In this study, average servings were compared with a daily recommended intake of 2.2 servings. This target was based on a weighted average of recommended servings for different age groups of the U.S. population (excluding the higher needs of pregnant and lactating women).

na = Not available. Note: Totals may not add due to rounding. Percentages computed from unrounded data.

¹Adjusted for losses and waste. One cup of milk or yogurt, 1-1/2 ounces of natural cheese, 2 ounces of processed cheese, 2 cups of cottage cheese, 1-1/2-cups of ice cream, 1/2 cup of canned evaporated milk, or 1/4 cup of dry milk or buttermilk count as one serving.

²Aggregate data, unadjusted for losses and waste.

³Cream cheese is counted in added fats.

⁴Excludes full-skim American, cottage, pot, and baker's cheese.

⁵Processed cheese is made by pasteurizing, emulsifying, and blending natural cheese.

⁶Includes items not shown separately, such as mellorine (from 1970-90).

Source: USDA's Economic Research Service.

cheese consumption. Total and saturated fats per serving in many cheeses are as high or higher than whole milk. When butter and fluid cream products (including sour cream) are included, total per capita consumption of milkfat increased slightly between 1970-79 and 1999.

(Cream products and butter are classified as added fats rather than as part of the dairy group in our tables.) Average annual per capita consumption of fluid cream products rose by more than 80 percent between 1970 and 1999 to 18 half-pints per person.

People Eat Fewer Fruits Than Recommended

The food supply provided 1.4 servings per person per day of fresh and processed fruit and fruit juices in 1999, less than half the 3 fruit servings a day recommended by the

Table 3
Three Fruits—Oranges, Apples, and Bananas—Contributed One Half of Total Daily Fruit Servings in 1999

Item	Per capita annual averages							Change, 1970-74 to 1999	1999 food supply, Pyramid-based servings per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	1999		
	Pounds, fresh-weight equivalent ²							Percent	Number
Total fruit ³	240.0	257.5	266.0	275.3	277.1	290.9	297.9	24	1.40
Fresh fruit	97.6	101.2	107.6	118.6	120.7	129.6	132.5	36	.73
Processed fruit	142.3	156.3	158.4	156.7	156.4	161.3	165.3	16	.68
Citrus, melons, and berries ³	141.5	151.6	148.2	143.8	142.0	156.3	157.2	11	.62
Fresh citrus ⁴	27.9	26.6	24.7	23.7	23.1	24.8	20.7	-26	.09
Oranges	15.0	13.8	13.0	12.8	12.2	12.5	8.6	-43	.04
Grapefruits	8.4	8.2	7.0	6.3	5.7	6.0	5.9	-30	.02
Melons ⁴	20.0	19.1	20.5	24.7	24.8	28.6	30.5	52	.15
Watermelon	12.6	12.0	12.1	13.3	14.1	15.7	15.8	26	.08
Cantaloupe	6.5	5.8	6.8	9.1	8.7	10.6	11.9	84	.06
Berries ⁴	3.5	3.5	4.0	5.1	6.1	6.8	7.1	103	.07
Fresh and frozen strawberries	2.9	3.0	3.5	4.3	4.8	5.5	5.8	100	.06
Kiwifruit	na	na	na	.2	.5	.5	.6	na	.01
Juices ⁴	90.1	102.4	99.0	90.3	88.0	96.1	98.9	10	.30
Orange juice	73.6	85.8	83.3	77.1	73.8	80.3	83.6	14	.27
Other fruit ⁴	98.5	105.9	117.8	131.5	135.1	134.6	140.7	43	.78
Fresh bananas	18.0	19.5	21.6	24.7	26.3	28.6	31.4	74	.15
Fresh apples	16.3	17.6	18.0	19.4	19.2	18.9	18.8	16	.10
Apple juice	5.9	8.2	14.7	18.5	20.2	20.5	21.8	272	.08
Fresh grapes	2.8	3.4	5.1	7.3	7.3	7.6	8.2	197	.08
Canned applesauce	5.5	5.1	5.0	5.3	5.4	5.0	5.1	-7	.03
Canned peaches	6.4	5.8	4.4	4.1	4.0	3.6	3.7	-43	.04
Raisins	5.8	6.8	8.0	9.1	8.1	7.7	7.2	22	.04
Fresh peaches and nectarines	4.8	5.6	6.3	6.0	5.9	5.1	5.3	10	.03
Canned pears	3.7	4.2	4.0	3.6	3.6	3.2	3.5	-7	.03
	Servings per capita per day ¹								
Total fruit ¹	1.06	1.12	1.17	1.27	1.30	1.36	1.40	28	1.40

The Food Guide Pyramid bulletin recommends three servings of fruit a day for a 2,200-calorie diet.

na = Not available. Note: Percentages computed from unrounded data.

¹Inedible portions removed and adjustments made for spoilage and waste. One medium apple, banana, or orange; 1/2 cup of chopped, cooked, or canned fruit; 1/4 cup of dried fruit; or 3/4 cup of fruit juice count as one serving.

²Inedible portions, spoilage, and waste included.

³Totals may not add due to rounding.

⁴Includes food item(s) not shown separately.

Source: USDA's Economic Research Service.

Food Guide Pyramid for a 2,200-calorie diet (table 3). This shortfall is particularly troublesome given scientific evidence linking frequent consumption of fruits and vegetables with substantially reduced risk of many chronic diseases, including certain cancers.

When measured in Pyramid servings, average fruit consumption has inched up 0.3 serving a day since the early 1970's—the equivalent of a third of a medium banana or apple or 1.75 ounces of fruit juice.

Consistent with recommendations, total fruit servings were fairly evenly divided between two fruit subgroups—citrus, melons, and berries (0.62 serving) and other fruit (0.78 serving). However, the data suggest that many consumers do not incorporate adequate variety into their daily diet. Six foods, out of more than 60 fruit products included in the food supply data, accounted for more than half (55 percent) of total fruit servings in 1999—orange juice (19 percent), bananas (11 percent), fresh apples (7 percent), apple juice (6 percent), watermelon (6 percent), and fresh grapes (6 percent).

Eating a wide variety of fruits and vegetables is important because different fruits and vegetables are rich in different nutrients. For example, a fresh orange has 27 times the fiber content of orange juice, and many less frequently consumed fruits (blueberries and cranberries) and vegetables (kale and beets) are excellent sources of protective phytochemicals. Some fruits and vegetables—orange vegetables like carrots and sweet potatoes; dark-green leafy vegetables like spinach; orange fruits like cantaloupe and apricots; and tomatoes—are excellent sources of carotenoids, including those which form vitamin A. Others (citrus, kiwi, strawberries, cantaloupe, broccoli, peppers, tomatoes, cabbage, potatoes, romaine lettuce, and spinach) are excellent sources of vitamin C. Still others (cooked dry

beans, oranges, dark-green leafy vegetables, and green peas) are good sources of folate. Potatoes, cooked greens, winter squash, bananas, dried fruits, orange juice, and cooked dry beans are excellent sources of potassium.

Potatoes Dominate Among Vegetables

Our vegetable consumption tells the same story—consumers tend to eat a limited variety of vegetables. While food supply servings met the overall recommendation, consumption was concentrated in a small number of foods. The food supply provided a daily average of four servings of fresh, frozen, canned, and dehydrated vegetables (including dry beans, peas, and lentils) in 1999, equal to the minimum four daily servings recommended for a 2,200-calorie diet (table 4). Per capita servings grew 28 percent, or nearly a whole (0.87) vegetable serving, between the early 1970's and 1999.

Five foods—iceberg lettuce, frozen potatoes, fresh potatoes, potato chips, and canned tomatoes—accounted for 52 percent of total vegetable servings in 1999. Legumes made up 6 percent of total consumption. Another 16 percent of total vegetable servings came from dehydrated potatoes (mainly instant potatoes), fresh tomatoes, fresh carrots, and fresh onions. No other single food, out of more than 70 vegetable foods in the food supply data, accounted for more than 3 percent of total vegetable consumption, or 0.1 serving. (Note: fresh, frozen, or canned vegetables are counted as three different foods.)

Dietary guidance suggests that consumers divide their total vegetable servings into three subgroups—dark green leafy and deep yellow vegetables; starchy vegetables, including potatoes, dry beans, peas, and lentils; and other vegetables. Thus, for a 2,200-calorie diet with a minimum serving recom-

mendation of 4 servings daily, consumption would be expected to be evenly divided at 1.3 servings from each subgroup. Within these groups, dark-green leafy vegetables and dry beans, peas, and lentils should account for 0.6 servings or about three-sevenths of total subgroup consumption, and deep yellow and other starchy vegetables should account for 0.8 servings or four-sevenths of their subgroups.

Average vegetable consumption tilted to starchy vegetables, especially white potatoes, in 1999, however. Frozen potatoes (mostly french fries) and potato chips together accounted for 43 percent of starchy vegetables servings and 17 percent of total vegetable servings. Consumption of dark-green leafy vegetables and deep yellow vegetables combined totaled 0.4 serving per capita per day, well below the 1.3 daily servings suggested for a 2,200-calorie diet. Likewise, average consumption of dry beans, peas, and lentils was woefully low.

Refined Grain Servings Are Higher than Recommended

The food supply provided 10 servings of flour and other commodities in the bread, cereals, rice, and pasta group in 1999, suggesting that many consumers met the 9-serving Pyramid recommendation for a 2,200-calorie diet (table 5). Total daily servings were nearly 50 percent higher than in the early 1970's. Increased consumption of white and whole wheat flour accounted for half of the increase. A threefold increase in corn products (used for some snack foods and Mexican-style foods like tortillas) and rice and a 54-percent increase in durum flour (used for pasta) consumption accounted for additional grain group servings.

The actual number of per capita daily servings from the grains group

Table 4

Iceberg Lettuce, Frozen Potatoes (Mainly French Fries), and Potato Chips Constituted More Than A Third of Total Daily Vegetable Servings in 1999

Item	Per capita annual averages							Change, 1970-74 to 1999	1999 food supply, Pyramid-based serving per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	1999		
	Pounds, fresh-weight equivalent ²								
Total vegetables	335.5	340.1	339.0	364.3	399.0	418.0	421.2	26	4.00
Fresh vegetables	148.1	145.7	148.7	162.7	173.6	185.9	192.1	30	2.13
Processed vegetables	187.3	194.4	190.3	201.5	225.4	232.1	229.1	22	1.86
Canned	102.1	100.0	98.8	99.1	112.7	108.6	105.7	4	.62
Frozen	47.3	56.9	56.5	65.5	72.9	82.4	82.5	74	.59
Dehydrated (includes dry beans)	21.3	21.3	17.8	19.4	22.7	25.0	24.6	15	.42
Potato chips	16.6	16.1	17.2	17.6	17.1	16.2	16.3	-2	.23
Dark green leafy vegetables	4.0	4.5	5.5	10.2	12.4	15.8	17.1	328	.15
Escarole, romaine, and leaf lettuces	.6	.5	.4	3.3	4.9	6.6	6.5	1,063	.07
Broccoli	1.7	2.3	3.5	5.3	5.8	7.4	8.2	386	.06
Spinach	1.8	1.7	1.6	1.5	1.6	1.8	1.8	2	.02
Deep yellow vegetables	15.2	14.5	14.5	14.8	17.8	21.7	22.0	45	.23
Carrots	10.2	9.4	9.7	10.4	13.5	17.3	17.6	73	.20
Sweet potatoes	5.0	5.1	4.8	4.5	4.3	4.3	4.0	-21	.03
Dry beans, peas, and lentils (legumes) ³	7.2	6.7	6.2	6.9	7.8	8.2	8.6	19	.24
Other starchy vegetables	152.7	153.6	146.7	154.2	164.6	174.9	173.1	13	1.38
Total potatoes	118.9	121.3	117.4	124.7	133.1	142.2	139.8	18	1.24
Fresh potatoes	55.5	49.5	48.4	48.5	49.3	49.4	49.2	-11	.38
Frozen potatoes	31.7	40.4	39.7	45.9	51.6	59.4	59.5	88	.46
Corn	27.8	26.9	24.6	25.2	27.2	29.0	29.7	7	.11
Peas	5.1	4.7	4.3	3.9	3.9	3.5	3.5	-31	.03
Other vegetables	156.3	160.7	166.1	178.2	196.5	196.7	197.5	26	2.00
Iceberg lettuce	22.8	24.8	24.6	25.4	25.9	23.2	25.3	11	.60
Canned tomatoes	63.0	62.7	62.5	64.5	76.0	74.4	72.8	15	.26
Fresh tomatoes	12.0	12.4	13.1	16.0	15.9	17.5	17.8	48	.13
Fresh onions	10.6	11.0	11.9	14.0	16.3	18.5	18.6	76	.10
Cabbage	11.1	10.7	10.3	10.4	10.3	9.9	9.3	-16	.06
Bell peppers	2.4	2.7	3.1	4.2	5.6	6.7	6.7	179	.07
Celery	7.3	7.1	7.2	6.9	7.2	6.3	6.2	-16	.07
Cucumbers	8.5	9.4	9.5	10.2	9.7	10.9	11.1	31	.06
————— Servings per capita per day ^{2,3} —————									
Total vegetables ^{1,3}	3.12	3.19	3.17	3.40	3.66	3.80	4.00	28	4.00
Cruciferous vegetables ⁴	.12	.13	.14	.16	.16	.15	.14	18	.14

The Food Guide Pyramid bulletin recommends four servings of vegetables a day for a 2,200-calorie diet.

Note: Totals may not add due to rounding. Percentages computed from unrounded data.

¹Excludes inedible portions and adjusts for spoilage and waste. One cup of raw leafy greens, 1/2 cup of other vegetables—cooked or chopped raw—or 3/4 cup of vegetable juice count as one serving.

²Includes inedible portions, spoilage, and waste.

³Includes all legumes consumed, including those that may have been selected as meat group servings.

⁴Cruciferous vegetables (members of the cabbage family) are not mentioned per se in the *Dietary Guidelines for Americans*. However, the Committee on Diet, Nutrition, and Cancer of the National Research Council advised the public in 1982 to eat more carotene-rich (dark green and deep yellow) vegetables and cruciferous vegetables (cabbage, broccoli, cauliflower, and Brussels sprouts) to lower the risk of certain cancers.

Source: USDA's Economic Research Service.

was probably higher than indicated because the food supply series fails to count many grain foods, particularly whole grain items. For example, the series excludes wheat foods not manufactured directly from wheat flour or bulgur, such as wheat bran, wheat germ, wheat berries, and products manufactured directly from these items, such as Wheaties, Shredded Wheat, Puffed Wheat, and All-Bran breakfast cereals and Triscuit crackers. Similarly, it excludes whole grain foods made directly from field corn and corn bran, such as corn tortilla snack chips and some breakfast cereals, and popcorn. In addition, the food

supply series excludes many whole grains that Americans rarely eat, such as amaranth, buckwheat, millet, kamut, quinoa, spelt, and triticale, as well as flours milled from these grains.

The U.S. Census of Manufactures series provides some information about whole grain foods, which the food supply series does not have. Using the most recent census data, ERS researchers estimate that the inclusion of wheat germ, wheat bran, popcorn, and whole field corn used in snack foods and some tortillas would add more than 18 pounds of grain foods per person to the official 1999 per capita food sup-

ply series (unadjusted for loss and waste), or roughly one serving per capita per day. Unpopped popcorn sold in consumer-size packages and popcorn used in manufactured products like Cracker Jack and Poppycock totaled more than 8 pounds per capita in 1997, or 0.43 serving a person a day. If bulk sales of popcorn to movie theater chains and the like, which are unmeasured but undoubtedly substantial, also were included, the contribution of popcorn to total grain intake would likely be more than a two-thirds serving a person a day.

While the food supply data suggest that average total grain con-

Table 5
Per Capita Grain Consumption Has Jumped by Nearly 50 Percent Since the Early 1970's¹

Item	Per capita annual averages							Change, 1970-74 to 1999	1999 food supply, Pyramid-based serving per capita per day ²
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	1999		
	Pounds ³							Percent	Number
Total flour and cereal products ²	135.1	141.2	147.0	167.9	186.8	198.6	201.9	49	9.97
Total wheat flour	111.0	116.1	117.3	128.3	139.9	146.9	148.4	34	7.69
White and whole wheat flour	103.9	109.0	110.8	119.1	127.2	134.5	137.5	32	7.39
Durum wheat flour ⁴	7.1	7.1	6.5	9.2	12.7	12.4	10.9	54	.30
Rye flour	1.2	.8	.7	.6	.6	.6	.5	-54	.02
Rice (milled)	7.2	7.4	10.1	12.6	16.7	18.7	19.4	170	.51
Total corn products	10.2	11.8	14.1	20.4	22.6	27.0	28.4	178	1.53
Corn flour and meal	6.3	6.5	8.2	13.0	15.3	17.1	17.7	180	.96
Hominy and grits	2.0	3.0	2.9	3.3	3.0	5.0	5.9	201	.25
Corn starch	2.0	2.4	3.1	4.1	4.2	4.9	4.8	147	.32
Oat products	4.7	4.1	3.8	5.0	6.3	4.9	4.5	-5	.20
Barley products	.9	1.0	1.0	.9	.7	.7	.7	-18	.02
	Servings per capita per day ³								
Total flour and cereal products ²	6.78	7.10	7.36	8.35	9.26	9.77	9.97	47	9.97

The Food Guide Pyramid recommends nine servings of grain products a day for a 2,200-calorie diet.

Note: Totals may not add due to rounding.

¹Excludes quantities used in alcoholic beverages and fuel. Excludes popcorn and some other whole grain foods.

²Adjusted for spoilage and waste. Servings are calculated based on a grain equivalent. The amount of flour in 1 slice of bread; 1 ounce of ready-to-eat cereal; or 1/2 cup of cooked cereal, rice, or pasta count as one serving.

³Unadjusted for spoilage and waste.

⁴Includes flour equivalent of imported pasta products.

Source: USDA's Economic Research Service.

sumption meets Pyramid recommendations, many consumers may need to change the types of foods consumed from this group to meet dietary recommendations for fiber, fat, cholesterol, and added sugars. Cakes, cookies, pastries, and pies—all high in fat and sugar—accounted for 13 percent of average total grain consumption in the 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII). Grain-based snack foods (crackers, popcorn, pretzels, and corn chips) accounted for another 4 percent. Actual consumption of grain-based sweets and snacks may be higher, as people tend to underreport snack and binge eating.

Whole wheat flour accounted for less than 2 percent of total wheat flour provided by the food supply in 1992, the latest year for which data are available. This shortfall in whole grain servings is confirmed by data from the 1994-96 CSFII, which indicate that average consumption of foods made from whole grains stood at about one serving per person per day, well below the minimum three servings recommended.

Consumption of Added Fats Skyrockets

After adjusting for losses and the nonfat portion of composite prod-

ucts like margarine, the per capita food supply provided 64 grams of added fats and oils in 1999, a 32-percent increase from the 49 grams available for consumption in the early 1970's (table 6).

Fats are added in cooking and at the table and in many processed food products, including baked goods, french fries, and snack foods. Added fat in processed foods may not be visible to consumers, who are typically not aware of the fat content. These added fats are consumed in addition to those that occur naturally in red meats, poultry, fish, nuts, eggs, and dairy products.

Although a healthful diet requires some dietary fat, excessive fat intake

Table 6
Average Consumption of Salad and Cooking Oils Increased by Three-Quarters Between 1970-74 and 1999

Item	Per capita annual averages							Change, 1970-74 to 1999	1999 food supply, added fats per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	1999		
	Pounds, product weight ²							Percent	Grams
Salad and cooking oils	16.8	19.5	22.3	24.9	26.4	27.8	29.4	75	28.9
Shortening	17.2	17.6	19.0	21.9	23.3	21.7	21.6	26	17.3
Margarine	11.0	11.4	10.8	10.6	10.7	8.7	8.1	-26	6.3
Lard (direct use) ³	3.6	2.5	2.1	1.5	1.4	1.9	2.0	-45	1.2
Edible beef tallow (direct use) ³	na	.4	1.4	1.2	1.8	3.0	3.7	na	2.3
Other edible fats and oils ⁴	2.2	1.9	1.6	1.4	1.5	1.4	1.6	-27	1.9
Dairy fats	na	na	na	na	na	na	na	na	5.8
Butter	5.0	4.4	4.6	4.6	4.5	4.5	4.8	-4	3.7
Cream cheese	.6	.8	1.1	1.4	2.0	2.2	2.4	266	0
	Half pints ²								
Heavy cream	1.0	1.1	1.5	2.1	2.5	3.5	3.9	276	.7
Light cream	.7	.6	.5	.8	.7	.9	1.2	76	.1
Sour cream	2.3	3.1	3.7	4.5	5.0	5.6	5.8	147	.5
Half and half	4.9	4.5	4.7	5.8	5.8	6.2	6.6	34	.2
	Grams per capita per day ¹								
Total added fats ¹	48.5	50.6	54.3	58.9	61.9	61.6	63.8	32	63.8

The Dietary Guidelines recommend that people limit their total fat consumption to no more than 30 percent of daily energy intake—about 73 grams of added and naturally occurring fat for a 2,200-calorie diet. In 1999, added fats alone accounted for 87 percent of this suggested upper limit.

na = Not applicable or not available. Note: Totals may not add due to rounding.

¹Adjusted for losses and waste. Fat content of butter and margarine calculated at 80 percent. One gram of fat equals 9 calories.

²Aggregate data, unadjusted for losses and waste.

³Excludes use in margarine and shortening.

⁴Specialty fats used mainly in confections and nondairy creamers.

Source: USDA's Economic Research Service.

is associated with increased blood cholesterol, heart disease, and some cancers. The *Dietary Guidelines* recommend that people limit total fat consumption to no more than 30 percent of daily energy intake—about 73 grams of added and naturally occurring fat for a 2,200-calorie diet.

The food supply data suggest that most consumers do not meet this recommendation. In 1999, added fats alone accounted for 87 percent of the recommended upper daily limit for total fat intake—or about 26 percent of total calories for a 2,200-calorie diet. Per capita consumption of salad and cooking oils, which is up by three-quarters since the early 1970's, accounted for

nearly half (45 percent) of added fats in 1999. These oils, which are largely unsaturated, are used mainly in mayonnaise and salad dressings. Animal fats—including lard, edible beef tallow, butter, and other dairy fats—which are major sources of saturated fats, accounted for 15 percent of added fats in 1999. Shortening and margarine, which are major sources of trans fatty acids, accounted for more than a third (37 percent) of added fats in 1999. Trans fatty acids and saturated fat raise blood cholesterol and increase risk of heart disease.

According to food supply nutrient data for 1997, added fats accounted for 52 percent of the total fat provided by the food supply. Assuming

that added fats continue to account for about 52 percent of the total fat provided by the food supply, Americans must, on average, consume two-fifths less added fat to bring total fat (added fat and naturally-occurring fat) consumption close to the recommended upper limit of 30 percent of calories.

Added Sugars Consumption Is Nearly Triple Dietary Targets

Although our body cannot distinguish between naturally occurring and added sugars, dietary guides focus on added sugars because foods high in added sugars often

Table 7
Average Consumption of Added Sugars Increased 29 Percent From 1980-84 to 1999

Item	Per capita annual averages							Change, 1970-74 to 1999	1999 food supply, added sugars per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	1999		
	<i>Pounds, dry-weight equivalent²</i>							<i>Percent</i>	<i>Teaspoons</i>
Total caloric sweeteners	123.6	123.8	122.4	130.6	141.6	153.6	158.4	29	34.1
Refined cane and beet sugar	100.5	91.5	74.7	62.0	64.4	66.7	67.9	-9	14.6
Corn sweeteners	21.7	30.9	46.4	67.3	75.8	85.6	89.1	92	19.2
High fructose corn syrup	1.5	9.4	27.4	47.1	52.8	62.0	66.2	142	14.2
Glucose	15.7	17.5	15.6	16.5	19.1	19.7	19.3	24	4.2
Dextrose	4.6	3.9	3.4	3.6	3.9	3.8	3.6	6	.8
Edible syrups	.5	.4	.4	.4	.4	.4	.4	0	.1
Honey	.9	1.0	.9	1.0	1.0	1.0	1.1	29	.2
	<i>Teaspoons per capita per day</i>								
Total caloric sweeteners supply									
Not adjusted for loss and waste ²	42.1	42.2	41.7	44.5	48.2	52.0	54.0	29	54.0
Adjusted for loss and waste	26.4	26.6	26.4	28.1	30.5	32.8	34.1	29	34.1

The Food Guide Pyramid bulletin recommends that people limit their consumption of added sugars to no more than 12 teaspoons daily for a 2,200-calorie diet. In 1999, average consumption of added sugars was nearly 3 times this suggested upper limit.

Note: Totals may not add due to rounding

¹Adjusted for loss and waste.

²Aggregate data, unadjusted for loss and waste. One teaspoon of sugar equals 15 calories.

Source: USDA's Economic Research Service.

supply calories but few nutrients, the so-called empty calories. High intake of sugary snack foods and desserts—colas, candy, cookies—and reduced intake of nutrient-rich foods—fruits, vegetables, grains—cuts needed nutrients.

To maintain nutritious diets and healthy weights, the Food Guide Pyramid advises consumers to limit added sugars to 12 teaspoons a day for a 2,200-calorie diet. After adjusting for losses, the food supply provided 34 teaspoons of added sugars (refined cane and beet sugar, corn sweeteners, edible syrups, and honey) per person per day in 1999—about the amount in 3-3/4 regular 12-ounce colas (table 7). Average

annual consumption of caloric sweeteners grew by 29 percent between 1980-84 and 1999.

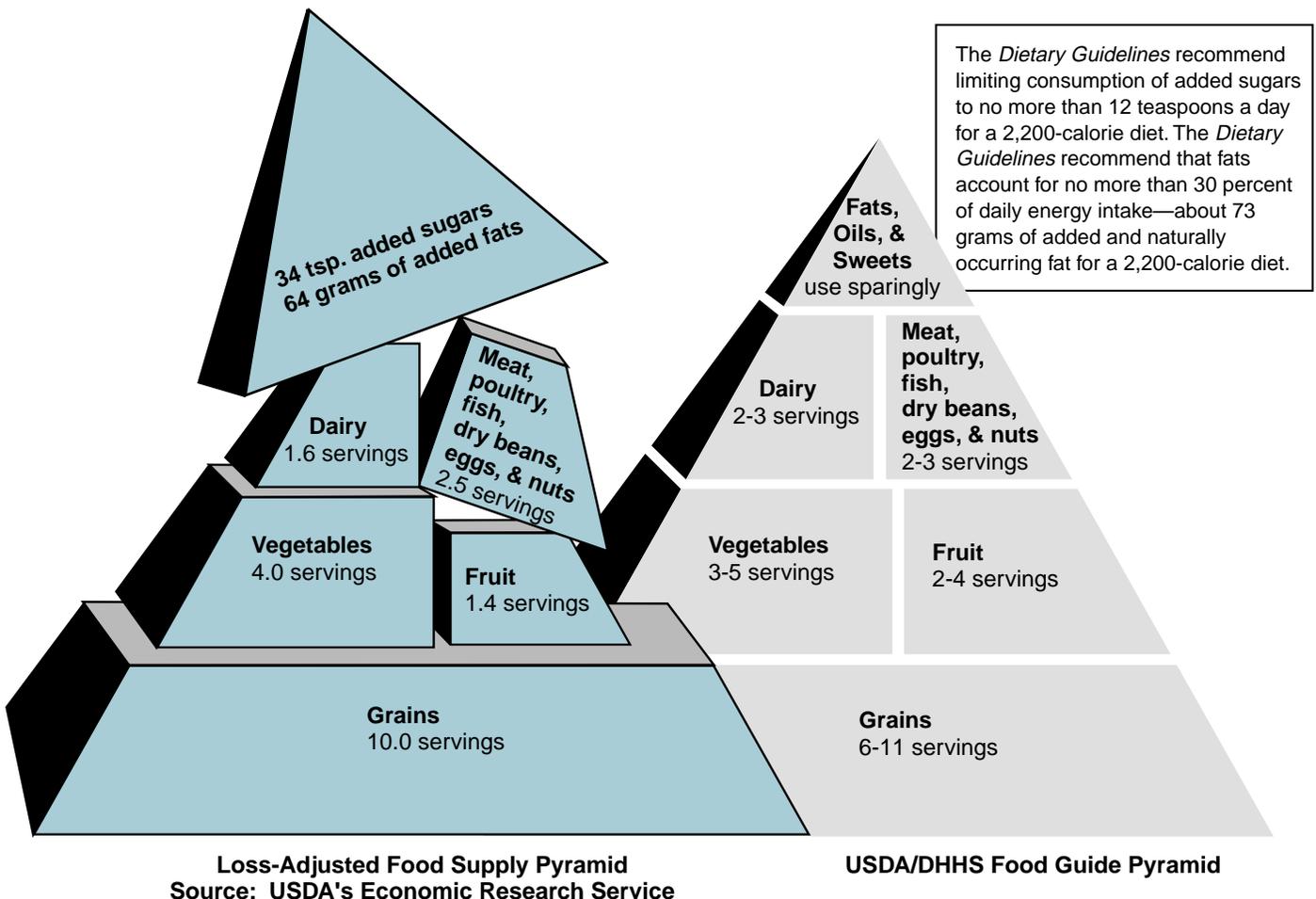
The ability of consumers to moderate their consumption of added sugars is complicated by the fact that caloric sweeteners are likely to be “hidden” in prepared foods. Although the food label mandated by the 1990 Nutrition Labeling and Education Act requires manufacturers to disclose the total sugar content of food, the label does not distinguish total sugars from added sugars, which may sometimes make it difficult for consumers to determine how much added sugar they actually consume. A coalition of leading health experts and organiza-

tions, concerned about the climbing rates of obesity and the rising level of added sugars consumption in the United States, has asked the U.S. Food and Drug Administration to require that food labels state the amount of sugar added to soft drinks, ice cream, and other foods.

Topsy-Turvy American Diet Fuels Rise in Obesity and Related Chronic Diseases

The average American has an unbalanced diet when compared with the recommended servings from the Food Guide Pyramid.

Figure 3
The Unbalanced American Diet



Instead of resembling a well-built pyramid, consumption based on loss-adjusted food supply data reflects a precariously built or tumbling pyramid, top heavy with added sugars and added fats (fig. 3). The midsection of the pyramid sags from underconsumption of fruits, dark green leafy and deep yellow vegetables, dry beans, fish, nuts, and lowfat dairy products. The base of the pyramid—the grain group—is somewhat larger than that recommended by the Food Guide Pyramid but is weakened by heavy consumption of refined grain foods (often loaded with fat and sugars) and woefully low consumption of fiber- and nutrient-rich whole grains (thought to decrease the risk of heart disease, diabetes, and some cancers).

Americans' weight gain over the last 20 years is no mystery. An unbalanced, increasingly high-calorie American diet largely explains why Americans continue to put on pounds. Initial results from the 1999 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, indicate that an estimated 61 percent of U.S. adults are either overweight or obese, compared with 56 percent in 1994 and 46 percent in the late 1970's. In 1999, 26 percent of U.S. adults were obese (at least 30 pounds overweight), up from 23 percent in 1988-94 and 15 percent in the late 1970's. Obesity puts one at significant risk for serious health problems like diabetes, hypertension, and heart disease. Loss-adjusted food supply data suggest that average daily calorie intake increased about 15 percent between 1984 and 1994, and remained stable between 1994 and 1997. Nearly 90 percent of that 15-percent increase in average calorie intake stemmed from higher consumption of refined grains (42 percent), added sugars (23 percent), and added fats (23 percent).

Obesity prevention requires changes in individual behavioral patterns as well as eliminating environmental barriers to healthful food choices and active lifestyles—both exceedingly difficult to achieve. In the January-February 2000 issue of *Public Health Reports*, nutrition professor Marion Nestle and nutrition activist Michael Jacobson recommend major governmental and societal changes to reduce the prevalence of obesity. Their paper, "Halting the Obesity Epidemic: A Public Health Approach," urges legislators, researchers, educators, businesses, urban planners, transportation experts, and nonprofit groups to fight obesity in a more creative way and to take immediate action. Specific recommendations include:

- Mounting large-scale mass-media campaigns to promote healthier diets and physical activity.
- Requiring chain restaurants to provide information about calorie content on menus or menu boards.
- Designating more downtown areas as pedestrian malls and automobile-free zones.
- Having health-insurance companies pay for effective weight-loss programs.
- Changing government policies and corporate practices, including a ban in schools on the sale of soft drinks, candy bars, and other foods high in calories, fat, and sugar.

Nestle and Jacobson conclude: "Ending the obesity epidemic will require much greater knowledge of effective diet and activity strategies than is currently available. The research focus must extend beyond genetic, metabolic, and drug development studies to encompass—and emphasize—population-based behavioral interventions, policy development, and program evaluation."

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Spotlight on National Food Spending

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Food spending in the United States rose 4.9 percent to \$788.6 billion between 1998 and 1999 (table 1). Total expenditures for eating out (food away from home) rose from \$352.6 billion in 1998 to \$374.7 billion in 1999. The 6.3-percent increase is the largest yearly increase in food away from home spending since 1990, when food prices away from home were high and expenditures increased 7.3 percent. Retail food expenditures (food at home) increased just 3.8 percent—from \$398.9 billion in 1998 to \$413.9 billion in 1999.

Adjusting for inflation, which was a low 2.2 percent in 1999, total food spending at home rose 1.4 percent in 1999 and food away from home rose 4.1 percent. The slower real (inflation-adjusted) growth for food at home than for food away from home in 1999 is not unusual during a nonrecessionary year.

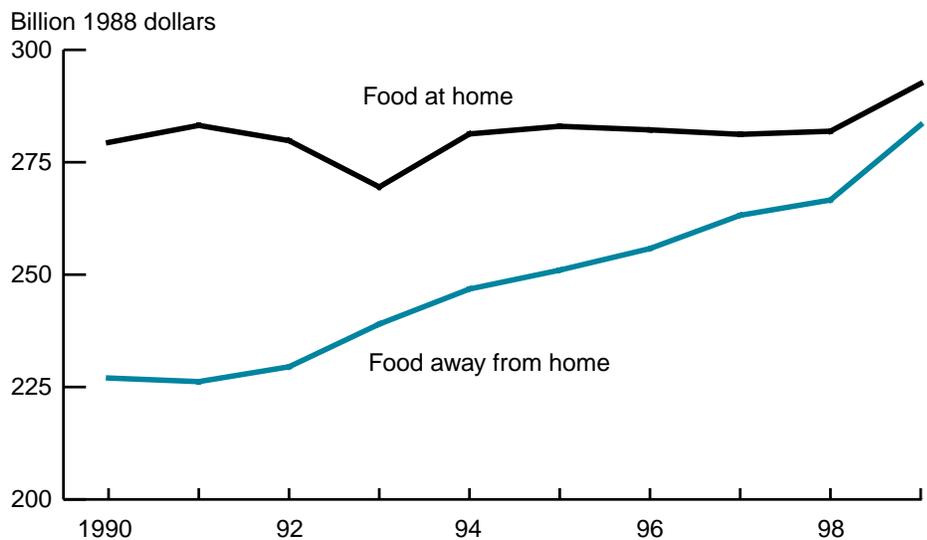
Between 1990 and 1999, total real food expenditures increased 13.7 percent. Real spending on food away from home grew a whopping 24.8 percent, while real food at home spending increased only 4.7 percent (fig. 1). Food spending patterns differed over the decade between the recession years at the beginning and the prosperous years at the end. During the 1990-91 recession, real spending on food away

from home declined 0.4 percent, while spending for food at home rose 1.3 percent. One of the ways people economized during the recession was by eating out less often or by patronizing less expensive places. The share of total food dollars spent away from home declined from 44.7 percent in 1989 to 44.0 percent in 1990.

With the subsequent economic recovery, inflation-adjusted spending on food away from home soared. Real spending for food at home dipped in 1992 and 1993 and

remained fairly constant. By 1996, spending for food away from home accounted for 46 percent of food expenditures, and, in 1999, away-from-home spending reached a record 47.5 percent of total food expenditures. Rising incomes during the 1990's are chiefly responsible for the increased spending on food away from home. Even at-home food spending reflects the decade's prosperity as purchases of more expensive, prepared entrees and side dishes boosted at-home food expenditures.

Figure 1
Food Expenditures at 1988 Prices



Note: The U.S. Census Bureau revised these data series in 1998.

Table 1
Food Spending Rose 4.9 Percent in 1999

Expenditures	1990	1996	1997	1998	1999	Change, 1998-99
	<i>Billion dollars</i>					<i>Percent</i>
Total food and beverages ¹	638.4	780.9	817.7	842.0	884.7	5.1
Total food (excluding alcohol)	565.4	697.1	729.7	751.5	788.6	4.9
At-home food	316.8	376.5	390.5	398.9	413.9	3.8
Sales	309.1	369.7	383.8	392.3	407.3	3.8
Home production and donations	7.7	6.8	6.7	6.5	6.6	-1.5
Away-from-home food	248.7	320.6	339.2	352.6	374.7	6.3
Sales	225.7	292.3	309.5	322.1	343.7	6.7
Supplied and donated ²	23.0	28.3	29.7	30.5	31.0	1.6
Alcoholic beverages	73.0	83.8	88.0	90.5	96.1	6.2
Packaged	38.2	42.2	43.7	44.7	48.7	8.9
Drinks	34.8	41.6	44.3	45.8	47.4	3.5

Note: Data may not add due to rounding.

¹Includes all food and alcoholic beverages, regardless of who paid for them.

²Includes government subsidies for school lunch programs.

Source: USDA's Economic Research Service.

Table 2
Rise in Personal Food Expenditures Lower Than Increase in Disposable Personal Income¹

Component	1990	1998	1999	Change, 1998-99
	<i>Billion dollars</i>			<i>Percent</i>
Disposable personal income	4,293.6	6,286.2	6,639.7	5.6
Total personal consumption expenditures	3,831.5	5,848.6	6,257.3	7.0
Food	489.1	659.3	691.4	4.9
At home	311.2	395.5	410.5	3.8
Away from home	177.9	263.8	280.9	6.5
Alcoholic beverages	76.0	90.5	96.1	6.2
At home	38.2	44.7	48.7	8.9
Away from home	37.8	45.8	47.4	3.5
Nonfood	3,266.4	5,098.8	5,469.8	7.3
Housing, household supplies, fuel, furniture	998.7	1,471.5	1,555.2	5.7
Transportation, cars, gasoline	453.7	660.5	709.8	7.5
Medical care	585.2	894.3	941.3	5.3
Clothing and shoes	303.0	286.3	306.3	7.0
Other durable goods	na	140.3	152.1	8.4
Other nondurable goods	160.3	442.9	494.0	11.5
Other services	297.4	878.2	948.4	8.0
Other miscellaneous	468.1	324.8	362.7	11.7

Notes: Data may not add due to rounding. Food expenditures represents those paid for by consumers with cash or food stamps. Total personal consumption expenditures are the sum of food, alcoholic beverages, and nonfood items.

na = Not available.

¹As of July 2000.

Sources: Food and alcoholic beverage data are from USDA's Economic Research Service. All other data are from U.S. Department of Commerce, Bureau of Economic Analysis.

Preliminary figures on total food sales (a beginning point to estimate food spending) in the first 6 months of 2000 show spending for food at home up 5.1 percent from the same period in 1999, and away-from-home food spending up 12.4 percent. Food sales exclude donations and food furnished to employees, patients, and inmates, which are included in the total food expenditures reported above. Inflation-adjusted food sales from mid-1999 to mid-2000 increased 7.0 percent

for food at home, while away-from-home spending increased 14.8 percent.

Americans Spend 10.4 Percent of Income for Food

Personal food spending shows another perspective on the trend. It behaves differently from total food spending because it excludes expenditures by governments and businesses. Personal food expenditures

rose 4.9 percent in 1999, while spending on housing, household supplies, fuel and furniture went up 5.7 percent, and clothing expenditures increased 7.0 percent (table 2). Higher fuel prices and an increase in the number of vehicles purchased in 1999 contributed to an increase of 7.5 percent for personal spending on transportation, cars, and gasoline. Within personal food expenditures, spending for food away from home grew 6.5 percent compared with a 3.8-percent increase in expenditures for food at home. From 1990 to 1999, personal spending for food away from home grew 57.9 percent and at-home personal food spending grew 32.0 percent.

In 1999, 10.4 percent of household disposable personal income was spent on food, down from 11.4 percent in 1990. Households spent 6.2 percent of their 1999 disposable personal income for food at home and 4.2 percent on food away from home. A decade earlier, Americans spent 7.2 percent of their disposable personal income for food at home and 4.1 percent for food away from home. ■

Updated Data Available

USDA's Economic Research Service provides newly revised figures twice a year—spring and fall—through the Internet and the AutoFAX system.

Internet: Find updated figures at the Economic Research Service website at www.ers.usda.gov/briefing/CPIFoodandExpenditures/Data/foodexpendituretables.htm

AutoFAX: To receive updates by AutoFAX, dial (202) 694-5700 from a FAX machine with either a handset

or speaker so you may respond to recorded voice prompts. Allow each of the voice prompts to finish before entering your response. Most responses are "Press 1 for yes, press 2 for no." Some FAX machines (Canon 770 series) require that you press the "start" or "send" button to signal the AutoFAX that you have entered a response.

Request document #11530 for a directory of U.S. food expenditure tables.

Food Spending by U.S. Households Grew Steadily in the 1990's

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The average U.S. household spent about \$2,037 per person on food in 1998, up 17 percent from the average expenditure in 1990 (table 1). Food purchased at supermarkets and other food stores (food at home) rose 18 percent from 1990 to 1998, while expenditures for eating out (food away from home) rose about 15 percent. Most of the increase for food at home was for cereal and bakery products (up 22 percent), fruits and vegetables (up 22 percent), sugar and sweets (up 34 percent), and miscellaneous foods (up 25 percent).

Looking at the increase in food expenditures between 1995 and 1998, at-home food expenditures increased by just 1 percent, whereas food-away-from-home expenditures increased by about 21 percent. The figures are reversed for the first half of the decade. Food-at-home spending rose about 17 percent between 1990 and 1995, while food-away-from-home spending declined.

How consumers allocate their food spending between at home and away from home is closely related to changes in disposable income (income after taxes). The first few

years of the decade, U.S. consumers coped with a mild recession. Our data indicate that during 1990-92 per capita disposable income rose a modest 6 percent. Consumers increased their food-at-home expenditures by 7 percent while decreasing food-away-from-home expenditures by approximately 9 percent.

Between 1995 and 1998, per person disposable income was up about 18 percent (\$20,033 in 1998 versus \$14,667 in 1995), which accounts for the 21-percent increase in expenditures on food away from home.

Food expenditures did not generally rise as fast as the general inflation rate between 1990 and 1998, indicating that Americans changed their eating habits so as to spend less money. For example, inflation as measured by the Consumer Price Index (CPI) increased by about 22 percent over this 9-year time span whereas total food expenditures increased by 17 percent. In inflation-adjusted dollars, consumers spent less on food in 1998 than they did in 1990.

If food spending is adjusted for inflation, the average per capita expenditure on food in 1990 was \$1,335, which included \$785 on food at home and \$550 on food away from home. Total per capita real (inflation-adjusted) food expenditures declined to \$1,233 in 1995, and

increased to \$1,265 in 1998, with \$752 spent on food at home and \$513 on food away from home that year.

Looking again at 1995-98, the CPI increased by 8 percent, whereas total food spending also increased



Incomes and food spending are on the rise for households headed by women.

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by about 8 percent. Hence, from the mid-1990's, Americans increased their expenditures on food equal to the increase in the cost of living. Americans increased their spending on items that offer time-savings and convenience, such as prepared foods, cereal and bakery goods, and food away from home.

Although average food expenditures in inflation-adjusted dollars declined by about 5 percent between 1990 and 1998, some demographic groups increased their food expenditures. For instance, unadjusted food expenditures by households headed by a single woman increased by about 32 percent, well above the increase in inflation, while food spending by households headed by 55- to 64-year-olds, and those 64 and older, increased by about 24 and 25 percent, respectively, slightly above the increase in inflation.

These findings are compiled from information contained in the Consumer Expenditure Survey (CES) released by the Bureau of Labor Statistics from 1990 through 1998. The CES data allow us to link con-

sumer expenditures with demographic characteristics. The statistics and analysis presented here are based on the urban portion of the sample which represents about 87 percent of the noninstitutionalized population.

Low-Income Households Continue To Spend Less Per Person

Income and household size continue to be the most influential factors affecting where and how Americans spend their food dollars (table 2). Households tend to spend more money for food as incomes rise, because they buy higher quality food items, more convenience foods, and more food away from home. In 1998, low-income households (with before-tax incomes averaging \$7,306) spent about \$1,754 per person, about 37 percent less than the \$2,768 per person that the wealthiest households spent (incomes averaging \$98,310), and about 16 percent less than the \$2,088 spent by middle-income households (incomes

averaging \$31,571). In 1990, low-income households spent about 34 percent less than the high-income households, but only 11 percent less than middle-income households.

While the amount spent on food increases with household income, the proportion of income spent on food decreases as income rises. In 1998, low-income households spent about 48 percent of their income on food, while middle-income households spent about 13 percent, and the wealthiest households spent approximately 8 percent, figures fairly constant over the 1990's.

Not unexpectedly, wealthier households spent more money and a larger share of their food expenditures on food away from home. In 1998, the wealthiest households spent 47 percent (\$1,301) of their food budget on food away from home, while the poorest group spent about 36 percent (\$638). These same two groups spent 49 percent (\$1,123) and 38 percent (\$577), respectively, in 1990. The middle-income group increased the proportion of their food dollars for away-from-home food, from 41 percent in

Table 1
Household Food Spending Rose More Slowly Than Income During the 1990's

Item	1990	1995	1998	1990-98	1990-95	1995-98
	<i>Dollars</i>			<i>Percent change</i>		
U.S. average annual household income before taxes	33,152	37,255	42,584	28	12	14
Annual food spending per person	1,745	1,879	2,037	17	8	8
Food at home	1,025	1,198	1,211	18	17	1
Cereal and bakery products	153	191	187	22	25	-2
Meats, poultry, fish, and eggs	272	319	313	15	17	-2
Dairy	122	128	133	9	5	4
Fruits and vegetables	180	207	219	22	15	6
Sugar and sweets	38	49	51	34	29	4
Fats and oils	28	35	33	18	25	-6
Beverages	92	107	102	11	16	-5
Miscellaneous foods	139	162	174	25	17	7
Food away from home	720	681	826	15	-5	21

Source: USDA's Economic Research Service from Bureau of Labor Statistics data.

1990 (\$709) to 42 percent in 1998 (\$881).

Between 1990 and 1998, the poorest households increased food-at-home spending by 18 percent, while the wealthiest households increased their spending 23 percent. However, the wealthiest households spent \$1,467 per person compared with \$1,117 per person for the poorest households (fig.1). Over the same time, the middle-income group increased food-at-home expenditures by about 20 percent, to \$1,207 per person.

While expenditures on total food increased by about 17 percent for the total population between 1990 and 1998, spending on major food

groups varied by income level (fig. 2). For example, the poorest households increased their spending on cereal and bakery products by 25 percent to \$177, whereas the middle and highest income households increased expenditures by 33 percent and 19 percent to \$194 and \$221, respectively, as contrasted to increases in expenditures for dairy products. The poorest households increased expenditures for dairy by just 6 percent to \$117, whereas the middle and highest income households increased their expenditures by 14 percent and 19 percent, respectively, to \$138 and \$162.

All income groups increased their expenditures on meat, poultry, fish,

and eggs between 1990 and 1998. Low-income households increased their spending by about 15 percent while the middle-income and wealthy households increased their spending by 10 percent and 21 percent, respectively. In dollars, the poor households again spent the least, about \$297 per person on meat, poultry, fish, and eggs, whereas the wealthy households spent about \$368 per person in 1998.

Household Size Affects Food Spending

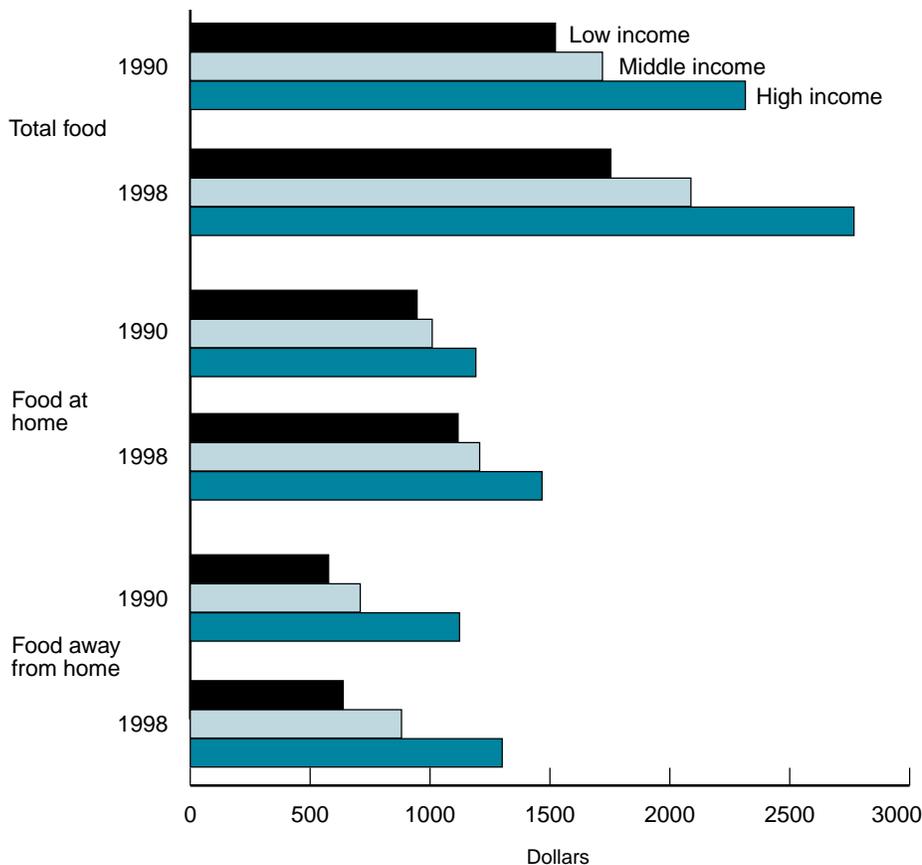
The amount a household spends on food increases as household size increases, but the rate slows with

Table 2
Food Spending Varies Substantially With Demographic Profile

Demographic profile	Food spending per person			1990-98	Change	
	1990	1995	1998		1990-95	1995-98
	<i>Dollars</i>			<i>Percent</i>		
All households	1,745	1,879	2,037	17	8	8
Household size:						
One	2,107	2,330	2,522	20	11	8
Two	1,939	2,039	2,170	12	5	6
Three	1,545	1,618	1,813	17	5	12
Four	1,350	1,435	1,549	15	6	8
Five	1,107	1,282	1,336	21	16	4
Six or more	900	982	1,125	25	9	15
Single female parent with children	1,097	1,258	1,451	32	15	15
Income category:						
Lowest quintile	1,523	1,564	1,754	15	3	12
Middle quintile	1,719	1,954	2,088	21	14	7
Highest quintile	2,315	2,473	2,768	20	7	12
Race:						
White	1,810	1,938	2,107	16	7	9
Black	1,241	1,522	1,556	25	23	2
Other	1,798	1,851	2,073	15	3	12
Age of householder:						
Under 25 (nonstudent)	1,557	1,454	1,629	5	-7	12
25-34	1,705	1,733	1,862	9	2	7
35-44	1,748	1,851	1,958	12	6	6
45-54	1,893	2,077	2,244	19	10	8
55-64	1,892	2,052	2,349	24	8	14
Over 64	1,652	1,949	2,060	25	18	6

Source: USDA's Economic Research Service from Bureau of Labor Statistics data.

Figure 1
Per Capita Food Spending Increases With Income



each additional member. That is, if the size of the household doubles, food spending typically does not double. Larger households tend to spend less per person, because the householders purchase more economical packages of food and eat more home-cooked meals than do smaller households. Also, many larger households have children, who eat less food than adults do.

In 1998, single-person households paid \$2,522 for food, about 20 percent above 1990, while households of six or more spent \$1,125 per person, about 25 percent greater than 1990. Three-person households spent about \$1,813 per person in 1998, about 17 percent greater than 1990 spending levels. Households with five members increased their

food expenditures by approximately 21 percent between 1990 and 1998.

Single-person households used about 45 percent of their food budget to eat out in 1998, while three-person households spent about 39 percent. Households with six or more members spent only 27 percent of their food budget at eating places in 1998. This mix of budget allocations makes sense because store-bought foods come mostly in family-sized portions and eating out reduces waste. In addition, single-person households may eat out more often to socialize, while larger households probably eat at less expensive restaurants to lessen the total bill or eat out only as a treat or on special occasions.

Interestingly, the percentage of the food budget spent eating out was lower in 1998 than in 1990 for single-person households and about the same for three-person households. In 1990, single-person households spent about 48 percent of their food budget on food away from home, whereas households with three persons spent about 38 percent. In contrast, households with six or more people spent 22 percent of their food budget on food away from home in 1990—a smaller portion than they spent in 1998.

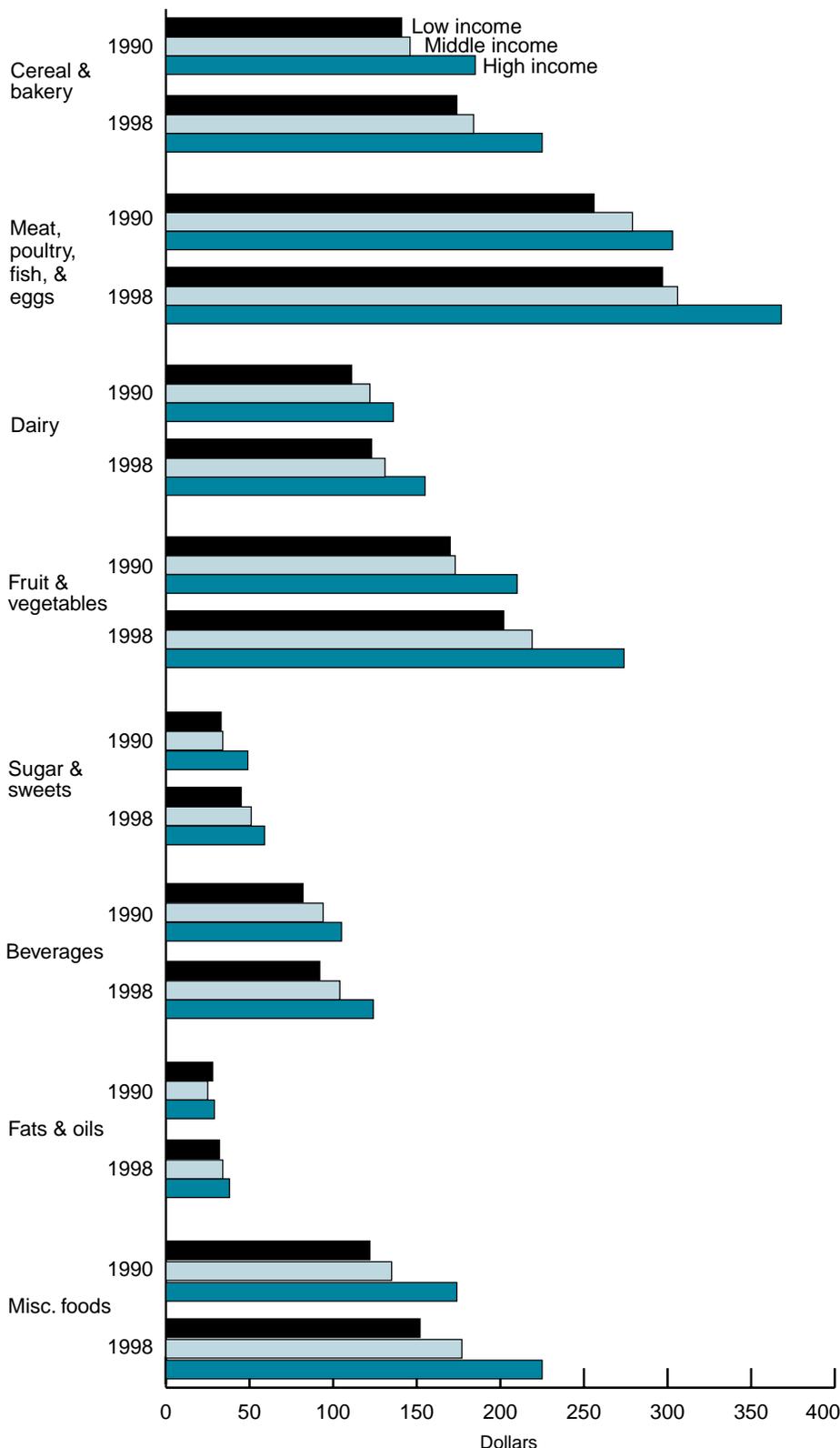
Household size also affects the mix of food spending for a household. For example, larger households tend to spend a larger share of their at-home food dollar on basic ingredients, such as flour and sugar, and lower priced items such as ground meat. Smaller households spend a larger share of their home food budget on foods such as fresh fruits and vegetables, steak, and frozen dinners.

Older and Female-Headed Households Increased Food Spending the Most

Households whose head was between 55 and 64 years old increased their food spending during 1990-98 by about 24 percent to \$2,349 per person, while households whose head was over 64 increased their food spending by about 25 percent to \$2,060. Undoubtedly, both these groups enjoy income levels at or above average. In fact, the \$2,349 spent per person by the 55 to 64 year-olds is well above the \$2,088 spent by the middle-income group. Heads of households 55 to 64 years old should be in their prime earning years.

Households that are headed by a female posted the largest increase in total food spending of any demo-

Figure 2
Spending for Individual Food Groups Varies With Income



graphic subgroup—about 32 percent between 1990 and 1998. However, these households tend to be among the poorest U.S. households, and their 32-percent boost was up from an average per person food expenditure of \$1,097 in 1990. Female-headed households' average per person food spending of \$1,451 in 1998 was below the \$1,754 spent by the average poor household.

Food Expenditures Likely To Follow Income Trends

If disposable income continues growing in the next decade, based on historical analysis, we would expect a steady gain in food expenditures, at approximately one-third to one-half the rate that disposable income is growing. As incomes increase, expenditures for convenience foods and food away from home also might increase as long as disposable income increases at a rate higher than the rate of inflation. ■

Foodservice Sales Reflect the Prosperous, Time-Pressed 1990's

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The 1990's were certainly a time to eat out. Foodservice sales grew by 49 percent, from \$228 billion in 1990 to \$339 billion in 1999. The big growth was in sales by commercial foodservice establishments that prepare, serve, and sell meals and snacks to the general public. Their sales more than doubled, from \$178 billion in 1990 to \$275 billion in 1999 (table 1).

Commercial foodservice establishments accounted for 81 percent of total foodservice sales in 1999. They include separate eating places, such as full-service restaurants and lunchrooms, fast-food/quick-service outlets, and cafeterias. Fast-food/quick-service outlets and restaurants dominate the foodservice industry. The two segments' combined sales of \$218.1 billion accounted for 64 percent of total foodservice sales in 1999 (compared with 63 percent in 1990). Commercial foodservice sales also include caterers and foodservice operations located in other facilities, such as lodging places, recreation and entertainment facilities, department stores, and separate drinking places.

In the commercial sector, retail hosts showed the largest sales

increase over the decade, rising from \$9.7 billion in 1990 to \$20.5 billion in 1999—a 112-percent increase (fig. 1). Retail hosts represent a variety of stores, such as department stores, drug stores, book stores, gas stations, and grocery stores that offer prepared meals and snacks designed to be eaten inside the store.

Sales nearly doubled for recreation and entertainment facilities during the 1990's. Attendance at sporting events continued to grow, and multiplex cinemas generated high traffic in shopping malls. Theme-park attendance was up, as new and improved attractions built repeat business. Theme parks, ball parks and stadiums, and other recreation and entertainment facilities continued to upgrade the quality and variety of their food offerings.

Cafeterias and separate drinking places where alcohol is served had the smallest increases in sales for the decade, just 11 percent each.

Things were not so robust for the noncommercial sector. Noncommercial foodservice sales grew by 29 percent between 1990 and 1999. Noncommercial foodservice operations prepare and serve meals and snacks as an adjunct, supportive service in institutional and educational settings, such as schools, nursing homes, child daycare centers, and to patients in hospitals. Noncommer-



Complete home-style meals from quick-service eating places and supermarkets are popular and have cut into sales of traditional fast-food fare.

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cial sales grew from \$50 billion in 1990 to \$64.5 billion in 1999 and accounted for 19 percent of total foodservice sales in 1999. Much of the increase came from foodservice operations in schools, colleges, and universities.

Foodservice in child daycare centers increased as the number of children in daycare centers continued to grow over the decade. Sales nearly doubled for associations (membership organizations, such as booster clubs, fraternal lodges, and citizen

associations) and correctional facilities. Transportation showed the smallest increase in sales (5 percent) between 1990 and 1999.

Sales in two noncommercial sectors fell during the decade. Hospital foodservice sales declined by 11 percent, and sales from vending machines fell 3 percent. Foodservice sales for military troop feeding and extended-care facilities ended the decade at the same level as the beginning.

Fast-Food Places Are Everywhere...

During the 1990's, people wanted quick, convenient meals. Fast-food outlets more than doubled their sales over 1990-99, and captured an increasing share of sales by separate eating places during the past decade—from 50 percent in 1990 to 53 percent in 1999.

Over the decade, fast-food companies found new ways to market their products. Consumers may eat

Table 1
Fast Food Sales Continue To Outpace Restaurants and Lunchrooms

Industry segment	Sales		Change	
	1990	1999	Nominal 1990-99	Real 1990-99
	Billion dollars		Percent	
Commercial foodservice	177,975	274,870	54	21
Fast food outlets	74,361	118,228	59	25
Restaurants and lunchrooms	70,256	99,859	42	12
Cafeterias	3,542	3,929	11	-13
Caterers	1,484	2,160	46	14
Lodging places	10,449	15,961	53	20
Retail hosts	9,696	20,540	112	66
Recreation and entertainment	6,624	12,464	88	48
Separate drinking places	1,563	1,729	11	-13
Noncommercial foodservice	50,071	64,476	29	1
Education	16,125	24,328	51	18
Elementary and secondary schools	7,896	12,093	53	20
Colleges and universities	8,229	12,235	49	17
Military services	1,884	1,954	4	-19
Troop feeding	1,052	1,054	0	-21
Clubs and exchanges	832	900	8	-15
Plants and office buildings	5,342	7,315	37	7
Hospitals	3,896	3,470	-11	-30
Extended care facilities	6,350	6,344	0	-22
Vending	5,614	5,439	-3	-24
Transportation	4,821	5,060	5	-18
Associations	1,170	2,098	79	41
Correctional facilities	2,150	3,548	65	29
Child daycare centers	1,024	2,114	106	62
Elderly feeding programs	143	177	24	-3
Other noncommercial	1,552	2,629	69	33
Total foodservice sales	228,046	339,346	49	17

Note: Foodservice sales exclude sales tax and tips. Real change is based on sales adjusted by the Consumer Price Index for all Urban Consumers (CPI-U).

Source: USDA's Economic Research Service.

while they shop, watch a ball game, or fill their gas tanks because fast-food outlets are found in gasoline stations, department stores, convenience stores, and supermarkets. McDonald's, for example, has outlets inside nearly 200 Chevron and Amoco service stations and in nearly 700 Wal-Mart stores across

the country. Convenience stores have also teamed with fast-food chains. Many convenience stores, such as 7-Eleven and Circle K, have either a fast-food kiosk in the store, or the stores sell branded fast-food items from Subway, Taco Bell, Blimpie, Burger King, Dunkin'

Donuts, Pizza Hut, Godfather's Pizza, Baskin-Robbins, and Arby's. Fast-food products are served in elementary and secondary schools across the country, as well as on college campuses. Pizza Hut and Taco Bell, the leaders in school foodservice, are in schools nationwide. Subway, Domino's, Chick-fil-A, Arby's,

Foodservice Sales Echoed the Economic Boom of the 1990's

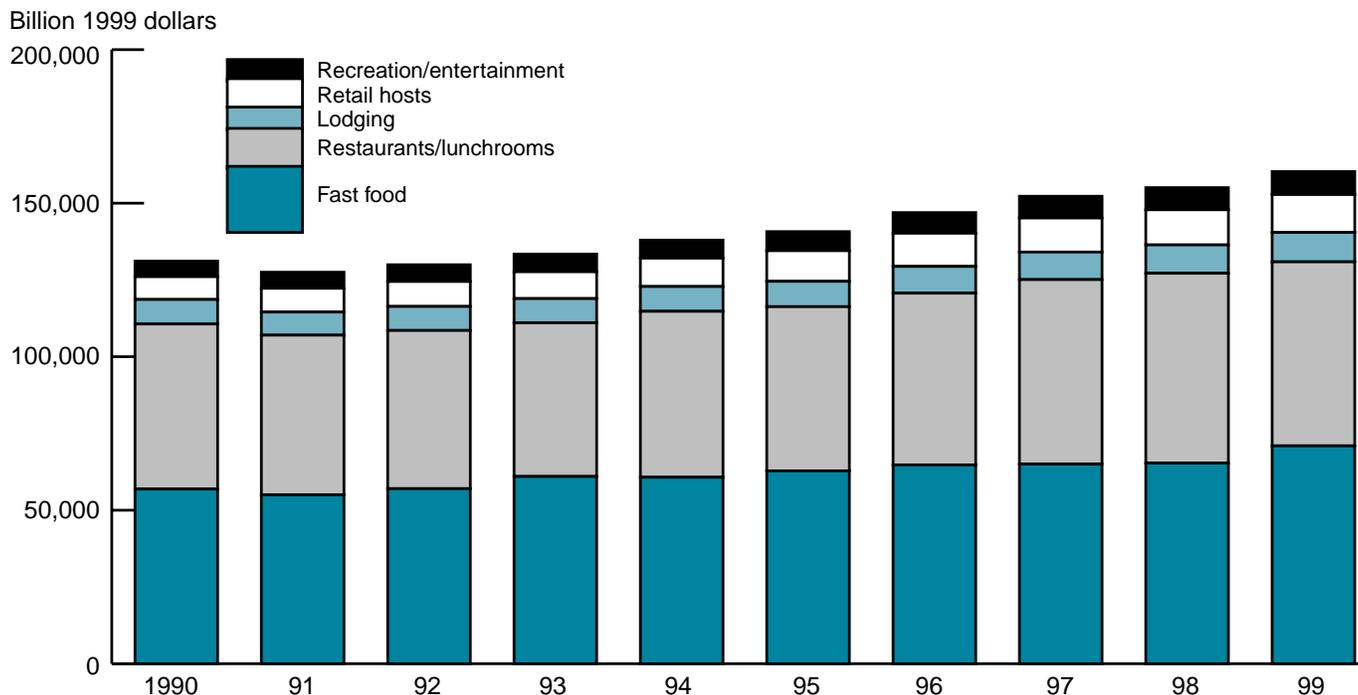
Adjusting foodservice sales for inflation over the decade provides a more accurate picture of how "real" sales grew. For example, during the 1990-91 recession, real (inflation-adjusted) sales by the top five commercial foodservice segments—fast-food/quick-service places, restaurants and lunchrooms, lodging places, retail hosts, and recreation and entertainment places—

were sluggish as people ate out less often and kept a sharp eye on menu prices (fig. 1). Real foodservice sales began to pick up in 1993 as the economic recovery brought higher incomes.

Just as with nominal (unadjusted for inflation) sales, fast-food/quick-service outlets saw their real sales outpace those of full-service restaurants. Real sales at kid-friendly,

quick-service establishments rose 25 percent over the decade, compared with the 12-percent increase for leisurely dining at full-service restaurants (table 1). Robust spending at retail hosts and at recreation and entertainment places in the mid- and late-1990's increased real foodservice sales in these segments by 66 percent and 48 percent, respectively.

Figure 1
Retail Hosts and Recreation/Entertainment Showed Big Gains in Sales in the 1990's



Note: Real sales were calculated using the Consumer Price Index for All Urban Consumers (CPI-U).
Source: Calculated from USDA, Economic Research Service data, 1990-99.

Little Caesar's Pizza, and McDonald's also offer some products in school lunchrooms.

As the U.S. market becomes saturated, fast-food outlets continue to increase internationally. McDonald's, one of the first U.S. fast-food chains to go abroad, operated 12,328 international units in 1998 (the latest year for which we have data). Other top U.S. chains operating abroad include KFC (with 5,291 outlets), Pizza Hut (with 3,814 outlets), and Burger King (with 2,316 outlets).

...And Take on Mom's Home Cooking

In addition to burgers, sandwiches, fries, and drinks, consumers in the 1990's also want complete meals like mom used to cook at home that are quick and convenient. Quick-service eating places, such as Boston Chicken, Koo Ka Roo, and Eatzi's, which offer complete home-style meals with several entrees and a variety of side dishes, have cut into traditional fast-food outlets' sales. These meals, called home meal replacements (HMR's), are

popular with consumers looking for take-home alternatives to traditional fast-food fare. (Sales of places that offer HMR's are included in fast-food sales in table 1.)

Supermarkets are also getting on the HMR bandwagon with menu offerings of fully prepared meals. Technomic, Inc., a research consulting firm in Chicago, reported that HMR sales by supermarkets rose 3 percent in 1999. (In comparison, overall supermarket sales rose 2.9 percent in 1999.) Technomic, Inc., projects that HMR sales by supermarkets will grow from \$12 billion in 1999 to \$15 billion by 2004.

Rosy Outlook Predicted

A majority of foodservice segments will see increases in meal and snack sales in 2000. The National Restaurant Association projects foodservice sales to grow to \$376 billion in 2000 and \$577 billion in 2010. Caterers are predicted to be one of the fastest-growing sectors of the restaurant industry in 2000, driven by the growing number of high-income households, as well as con-

tinued growth in the number of lavish events held by corporations.

Other sectors predicted to show strong growth in 2000 are retail hosts; recreation and entertainment facilities; schools, colleges and universities; correctional facilities; and child daycare centers. U.S. fast-food and restaurant companies are expected to continue expansion in the international arena. On the domestic front, fast-food/quick-service chains will continue to increase their share of the market by diversifying their offerings through multiple concepts—expanded takeout and delivery services, casual dining, and ethnic, family-style, and theme eating places.

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Food Marketing Costs: A 1990's Retrospective

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U.S. consumers spent \$618.4 billion on food in 1999 (excluding imports and seafood), up 37 percent from the \$449.8 billion spent in 1990 (table 1). Consumers bought a larger volume of food, value-added processing and packaging of at-home foods increased, spending at restaurants and fast-food outlets grew, and prices for marketing inputs rose. All of these factors contributed to the jump in food spending during the 1990's.

Consumers' changing preferences drove their food selections, affecting the marketing services needed to provide these foods. Busy consumers of the 1990's demanded quick, easy-to-prepare convenience foods. The strong economy of the last several years raised incomes and allowed more consumers to pay for highly processed convenience foods.

A changing workforce—with more working women and more two-income households—and modern cooking technology, especially microwave ovens, also played major roles in the marketing cost picture of the past decade. People have less time available to prepare food at

home, increasing the demand for quick, easy-to-prepare meals. Grocery stores took convenience a step further by offering prepared entrées and side dishes ready for the oven, microwave, or dinner plate. *Supermarket Business* magazine reported that service deli sales in grocery stores doubled from 1990 to 1999.

Demand for convenience was reflected in increased sales for meals and snacks consumed away from home. The proportion of the food dollar spent eating out grew from 44 percent in 1990 to 47.5 percent in 1999. This demand for convenience

reverberated throughout the food marketing industry and translated into a derived demand for a variety of marketing services—labor, packaging, transportation, energy use—which boosted aggregate marketing costs.

Consumer food expenditures can be separated into two broad components—marketing costs and the farm value. Marketing costs accounted for 80 percent of total consumer food spending, with the farm value comprising the remaining 20 percent. Higher marketing costs were the primary cause of ris-



The volume and variety of prepared foods offered by grocery stores boosted employment and labor costs for food stores over the last decade.

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ing consumer food expenditures over the past decade. Between 1990 and 1999, marketing costs rose 45 percent and accounted for most of the 37-percent rise in domestic consumer food spending. In comparison, the farm value of food purchases climbed only 13 percent between 1990 and 1999 (fig. 1).

Marketing costs are measured by the marketing bill, which is the difference between the farm value of domestically produced foods and the final cost to consumers. The marketing bill provides an estimate of the costs associated with processing, wholesaling, distributing, and retailing foods produced by U.S. farmers and eaten by U.S. consumers. Expenditures for imported food and seafood are excluded from these estimates.

Labor Costs Rose 56 Percent During the Decade

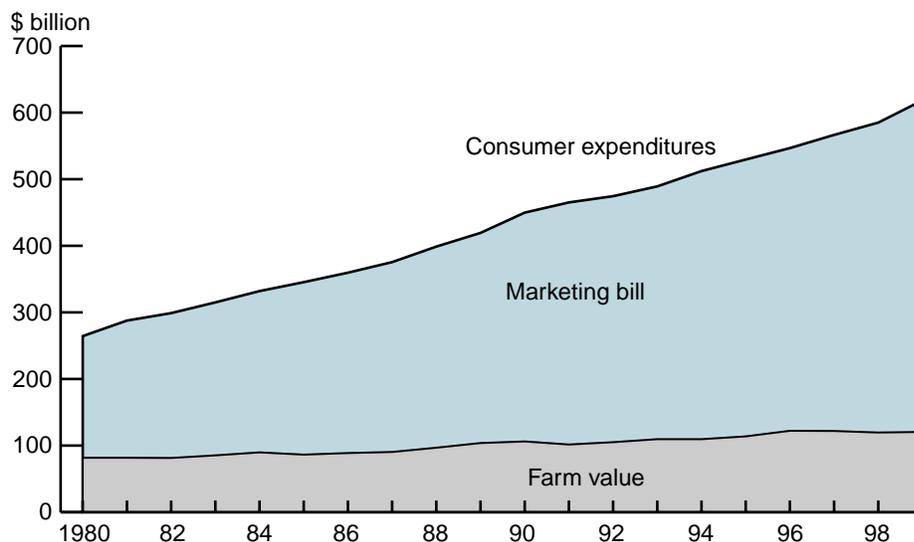
Labor costs are the largest component of the marketing bill. At \$240.1 billion in 1999, labor accounted for 39 percent of the food dollar in 1999,

up from 34.5 percent in 1990 (fig. 2). Moreover, labor costs accounted for 60 percent of the marketing bill increase during the 1990's.

Employment in the food industry rose 14.5 percent during the 1990's.

Eating and drinking places experienced the largest employment rise. Hiring in this sector surged 21 percent between 1990 and 1999. In 1999, 7.9 million people (about 56 percent of the 14 million workers in the food

Figure 1
Marketing Costs Rose 45 Percent Between 1990 and 1999



Data for foods of U.S. farm origin purchased by or for consumers for consumption both at home and away from home.
Source: USDA's Economic Research Service.

Table 1
Consumers' Demand for Convenience Boosts the Marketing Bill

Item	1980	1990	1995	1999	Change, 1990-99
	Billion dollars				Percent
Labor	81.5	154.0	196.6	240.1	56
Packaging materials	21.0	36.5	48.2	50.9	39
Rail and truck transportation	13.0	19.8	22.3	25.2	27
Fuels and electricity	9.0	15.2	18.6	21.8	43
Pretax corporate profits	9.9	13.2	19.5	26.2	98
Advertising	7.3	17.1	19.8	23.8	39
Depreciation	7.8	16.3	18.9	22.6	39
Net interest	3.4	13.5	11.6	15.2	13
Net rent	6.8	13.9	19.8	23.9	72
Repairs	3.6	6.2	7.9	9.5	53
Business taxes	8.3	15.7	19.1	21.5	37
Total marketing bill	182.7	343.6	415.7	497.9	45
Farm value	81.7	106.2	113.8	120.5	13
Consumer expenditures	264.4	449.8	529.5	618.4	37

Source: USDA's Economic Research Service.

marketing industry) worked at away-from-home eating places—a booming industry.

Food stores employed 3.5 million people in 1999, 24 percent of all food industry employees. Employment in food stores increased 8 percent over the last decade. Much of this rise was due to the extensive use of part-time employees, who made up as much as 65 percent of total employment at retail food chains. Foodstore employment increases were largely generated by the increase in labor-intensive food offerings, such as prepared foods in the salad bar, bakery, and deli sections.

On the other hand, food manufacturing employment rose only 1.5 percent to 1.7 million workers in 1999. This slight increase reflected increased mechanization and technological improvements in this sector, which raised employee productivity and reduced hirings. About 12

percent of food industry employees worked in food processing and about 7 percent in food wholesaling in 1999.

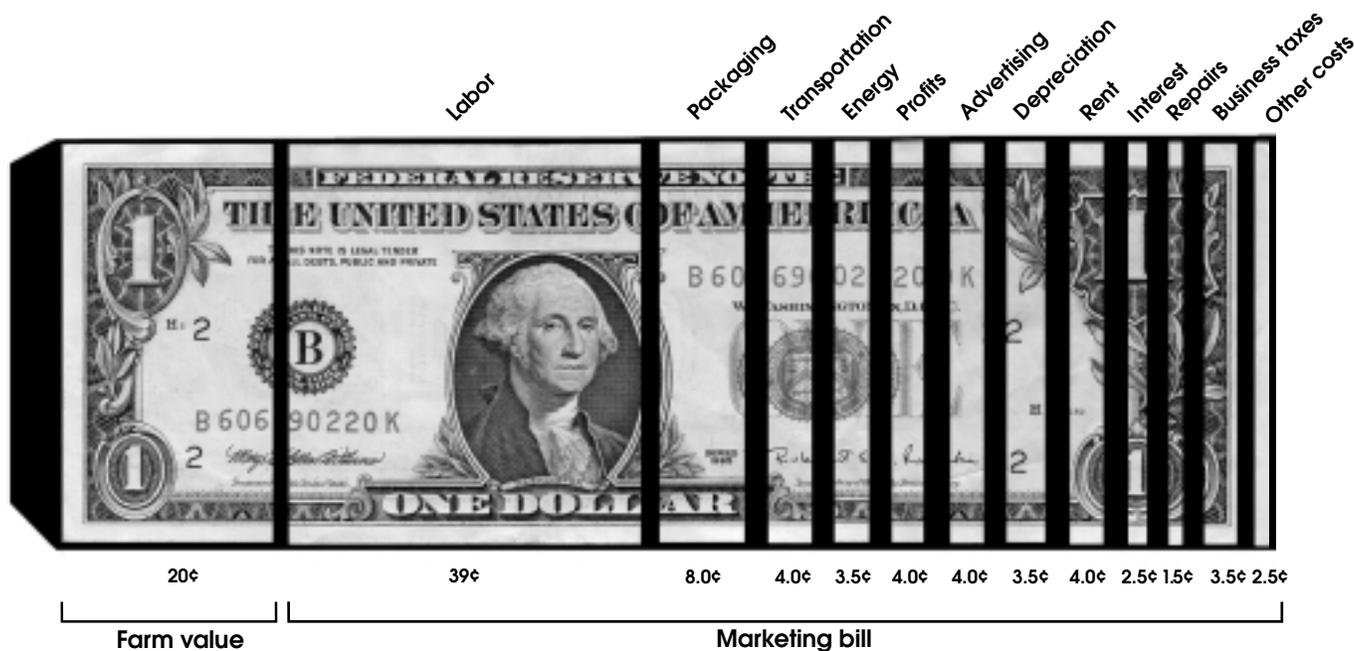
Increased demand for additional food industry employees also exerted upward pressure on hourly wages. For example, the wages of foodstore employees rose 27 percent during the 1990's, after an 11.5-percent increase the previous decade. Foodstore wages generally increased 2.5 to 3 percent per year during most of the decade. However, wages rose only 0.3 percent in 1991, with the largest increase in 1998, when wages climbed 4.3 percent. The rising cost of employee benefits was also an important factor affecting labor cost growth during the 1990's. This increase was largely due to higher medical care costs. However, increases in medical care costs were less of a factor by the end of the decade. The Con-

sumer Price Index for medical services grew 9 percent in 1990, but only 3 percent in 1999.

Packaging Costs Also Increased

Meanwhile, packaging—the second largest marketing cost component—also grew continuously over the last decade, although at a less dramatic pace than labor. Food industry purchases of packaging inputs rose 39 percent, from \$36.5 billion to \$50.9 billion over the decade in response to the demand for convenience foods, which required greater use of paperboard and plastic materials. This increase was considerably smaller than the 68-percent increase posted during the 1980's—a decade in which prices for plastic and other packaging materials rose at a faster rate than during the 1990's.

Figure 2
Labor Took Biggest Chunk of Food Dollar in 1999



Source: USDA's Economic Research Service.

The price of paper and paperboard (about 40 percent of total packaging costs) rose 26 percent during the 1990's in response to higher spending patterns and restricted industry production capacity, especially during the middle of the decade. This increase was substantially smaller than the 38-percent price rise for paper packaging recorded during the 1980's. Meanwhile, plastic prices fluctuated in response to changing oil prices and the price of competing packaging materials. The price of plastic rose 15 percent between 1990 and 1999, compared with a 31-percent increase during the 1980's.

Other Costs Displayed Steady Increases

Most other costs rose steadily, but retained roughly the same share of the total consumer food dollar. Energy and transportation costs grew at a fairly steady pace, rising 43 percent and 27 percent, respectively, during the decade. Changes in oil prices due to external shocks (such as the 1990-91 Persian Gulf crisis) had little effect on energy prices because food industry facilities are powered primarily by electricity and natural gas. On the other hand, oil price changes affect the trucking industry, which uses diesel fuel. The price of diesel oil declined through most of the 1990's, with major spikes in 1996 and 1999. However, the price of diesel oil was 18 percent lower in 1999 than in 1990. Therefore, oil prices tended to restrain transportation cost increases through most of the decade. Other factors, such as higher compensation for drivers, were largely

responsible for higher transportation costs.

Advertising expenses rose 39 percent, from \$17.1 billion in 1990 to \$23.8 billion in 1999. Food manufacturers spent about half this total, with foodservice companies spending another 25 percent, and food retailers about 15 percent. Depreciation, rent, and repairs together came to \$56 billion, and accounted for 9 percent of the 1999 food dollar. The foodservice sector incurred about 40 percent of these costs as the result of high property rents. Foodstores made up about a quarter of total depreciation, rent, and repair costs, while manufacturing and wholesaling establishments together accounted for the remaining 35 percent. Net interest accounts grew 13 percent during the last decade. Most of the increase occurred in the foodstore sector, reflecting higher debt acquired due to merger and acquisition activity.

Farm Value Posted Big Gains in Mid-1990's

The farm value rose at a considerably smaller clip than the marketing bill over the last decade, consistent with the long-term trend. However, 1995 and 1996 were exceptions to the overall trend. The 1995 farm value rose 3.8 percent, a larger percentage increase than the marketing bill. In 1996, the farm value grew by \$8.4 billion, greater than marketing costs in both absolute dollars and as a percentage, thereby exerting a larger effect than the marketing bill on consumer food expenditures for the first time since 1973. The 1995 and 1996 increases reflected sharp, across-the-board farm price rises in

1995, and for several commodities—eggs, poultry, fresh fruit, wheat, and dairy products—in 1996.

Future Costs May Mirror Inflation

Marketing costs are complex aggregates which do not change dramatically, as do the prices of individual commodities such as wheat or beef. Marketing costs tend to provide a cushion, which absorbs the shocks of changing farm values, so only a portion of a change in farm prices are reflected at the retail level. Over the years, marketing costs have persistently tended to rise, following the rate of inflation, whether farm prices rose or fell. Because marketing costs account for about three-fourths of consumer food expenditures, marketing cost increases can, and often do, override the effect of a reduction in farm prices on retail prices.

Assuming these market fundamentals hold, the trends in farm value and marketing costs of the last decade are expected to continue into the next. The farm value will probably continue to decline gradually as a share of total consumer expenditures, while the marketing bill will continue to exhibit a corresponding increase. Labor costs will continue to gradually rise as a percent of the consumer food dollar. This largest component of the consumer food dollar will rise roughly commensurate with the general rate of inflation, assuming the labor market supplies sufficient workers to meet food industry requirements. Other marketing costs are expected to change in a less dramatic manner than labor. ■

Food Assistance Expanded, Then Contracted in the 1990's

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USDA's Food and Nutrition Service administers 15 domestic food and nutrition assistance programs that differ by target populations, types of benefits provided, and size. The goals of these programs are to provide needy people with access to a more nutritious diet, to improve the eating habits of our Nation's children, and to help America's farmers by providing an outlet for the distribution of food purchased under farmer assistance authorities. These programs provide a safety net to people in need and represent our Nation's commitment to the principle that no one in our country should fear hunger or experience want. Five programs—Food Stamp, National School Lunch, WIC, Child and Adult Care Food, and School Breakfast Programs—together account for over 90 percent of all Federal expenditures for food assistance.

Total Federal expenditures for food and nutrition assistance programs in nominal terms (not adjusted for inflation) increased dramatically in the first half of the 1990's. Total nominal expenditures were \$24.9 billion in fiscal 1990 and grew by over 50 percent before peaking at \$38.1 billion in fiscal

1996. (The data on expenditures and participation cited in this article refer to fiscal years, which run from October 1 to September 30.) Total nominal expenditures for Federal food and nutrition assistance then decreased almost 14 percent from fiscal 1996 to fiscal 1999.

Nutrition assistance expenditures in nominal dollars compared over time may be a misleading measure of the resources devoted to those programs. Although the annual rate of inflation, or increases in the general level of prices over time, averaged less than 3 percent during the 1990's, price-level changes accumulate and become significant over longer periods. For example, between fiscal 1990 and fiscal 1999, average prices increased almost 29 percent.

Adjusting nominal expenditures for inflation shows that real (inflation-adjusted) expenditures for food and nutrition assistance increased by a modest 2.7 percent over the course of the decade (table 1). (By comparison, the U.S. population increased by 9.3 percent during the same period). Year-to-year real expenditures for food and nutrition assistance were unstable during this period. Real total expenditures increased dramatically during the recessionary years of 1991 (11 percent) and 1992 (13 percent), peaked in 1994, and then decreased 21 per-

cent between 1994 and 1999 (fig. 1). The Food Stamp Program drove the significant rise and fall in real total expenditures. In contrast, expenditures for other major food and nutrition programs increased during this period.

Food Stamp Program Dominates Assistance Expenditures

The Food Stamp Program, the cornerstone of USDA's nutrition assistance programs, helps low-income households buy the food they need for a nutritionally adequate diet. The program provides monthly benefits for participants to purchase approved food items at approved retail food stores. The Food Stamp Program is an entitlement program, which means that all people who meet the eligibility requirements are automatically entitled to participate in the program. Expenditures for the program increase or decrease to meet the costs of serving the number of people who apply and are eligible for assistance. As a result, the program adjusts quickly to changes in economic conditions, expanding to meet increased need when the economy is in recession and contracting when the economy is growing and job opportunities and wages are favorable.

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Eligibility is based on a household's size, assets, and gross and net monthly income. Except for households with elderly or disabled members, gross monthly income cannot

exceed 130 percent of the poverty guidelines (\$1,782 per month for a family of four in most places in fiscal 1999). Net monthly income, which equals gross income minus

various deductions, cannot exceed the poverty guidelines. Households are permitted \$2,000 in countable assets (excluding homes)—\$3,000 if the household contains an elderly

Table 1
Real Expenditures for the Food Stamp Program Were Lower in Fiscal 1999 Than in Fiscal 1990, While Other Nutrition Assistance Programs Grew

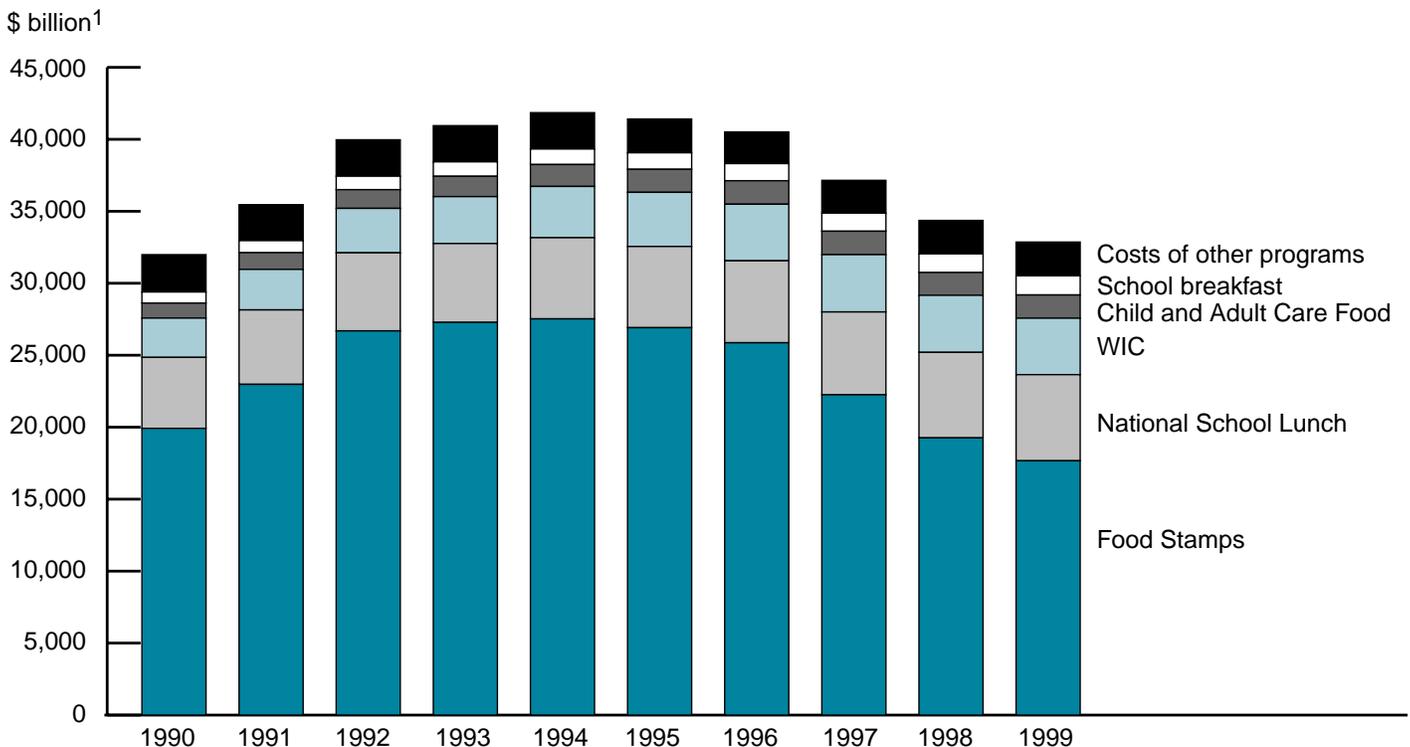
Nutrition assistance program	Nominal expenditures		Real expenditures ¹		
	FY 1990	FY 1999 ²	FY 1990	FY 1999 ²	Change, FY 1990-99
	<i>Million dollars</i>		<i>Million dollars</i>		<i>Percent</i>
All programs	24,874.0	32,862.3	31,986.4	32,862.3	2.7
Food Stamp	15,491.1	17,665.2	19,920.6	17,665.2	-11.3
National School Lunch	3,833.7	5,985.6	4,929.9	5,985.6	21.4
WIC	2,122.2	3,922.3	2,729.0	3,922.3	43.7
Child and Adult Care	812.9	1,613.5	1,045.3	1,613.5	54.3
School Breakfast	596.2	1,333.6	766.7	1,333.6	73.9

¹Real expenditures were calculated using the Consumer Price Index for All Urban Consumers (CPI-U) and are reported in fiscal 1999 dollars.

²1999 data subject to change with later reporting.

Source: Calculated by USDA's Economic Research Service using data from USDA's Food and Nutrition Service.

Figure 1
Real Expenditures for Nutrition Assistance Rose then Fell During 1990-99



Note: Real expenditures were calculated using the Consumer Price Index for All Urban Consumers (CPI-U).

¹FY 1999 dollars.

Source: Calculated by ERS using data from USDA's Food and Nutrition Service.

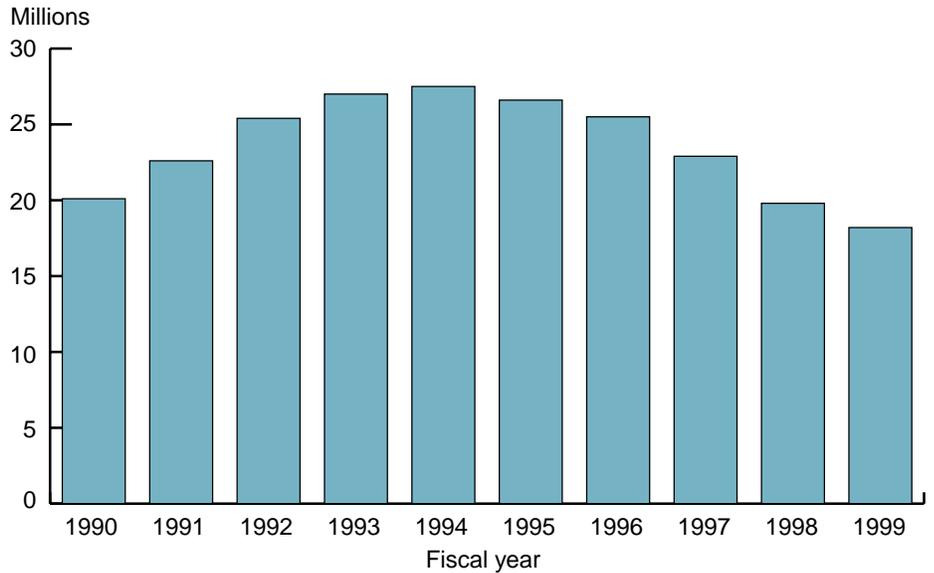
person. Monthly household food stamp benefits are based on net monthly income and household size. The maximum benefit is based on USDA's Thrifty Food Plan, a market basket of suggested amounts of foods that make up a nutritious diet and can be purchased at a relatively low cost.

Because of its size, the Food Stamp Program has a strong influence on overall trends in total expenditures for nutrition assistance. However, this influence decreased during the 1990's. In fiscal 1992, the Food Stamp Program accounted for almost 68 percent of total expenditures for nutrition assistance, by fiscal 1999, it accounted for only 54 percent. Despite its declining share, the trend in real Food Stamp Program expenditures from fiscal 1990 to fiscal 1999 drove the trend in real total nutrition assistance expenditures. Food Stamp Program expenditures increased during the early part of the decade, peaked in 1994 at \$27.5 billion in real terms (1999 dollars), and decreased every year thereafter. In fiscal 1999, real Food Stamp Program expenditures totaled only \$17.7 billion, a decrease of 36 percent from fiscal 1994.

Strong Economy and Welfare Reform Reduce Food Stamp Rolls

Expenditures for the Food Stamp Program reflected the trend in the number of people receiving food stamps during the same period. Average monthly participation, 20.1 million in fiscal 1990, increased each year up to fiscal 1994 when it reached a historic peak of 27.5 million per month (fig. 2). In general, participation in the Food Stamp Program is inversely related to economic conditions. During the recession of the early 1990's, the numbers of unemployed people and those in poverty rose, increasing the demand

Figure 2
Number of Food Stamp Participants Decreased After 1994



Source: USDA's Food and Nutrition Service.

for food stamps. At the program's peak in fiscal 1994, about one in nine U.S. residents received food stamps.

Average monthly participation in the Food Stamp Program decreased by almost 34 percent between fiscal years 1994 and 1999. In fiscal 1999, participation averaged only 18.2 million people per month—about 1 in 15 U.S. residents. The longest period of economic growth in American history has certainly been an important contributor to the steady decrease in participation. As people find work, their households' income increases, and they may either no longer qualify for food stamps or think they no longer need food stamps.

In addition, welfare reform legislation implemented by the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 directly reduced participation in the Food Stamp Program by restricting the eligibility of some legal immigrants and by limiting the time that some nonworking able-bodied people may receive food stamp benefits.

The Act ended eligibility for some legal immigrants, although Congress later restored benefits to many children and elderly immigrants. The Act also limits benefits for able-bodied adults between 18 and 50 years of age without dependent children to only 3 months in every 36-month period if they do not work or participate in a workfare or employment and training program (this requirement may be waived in some locations based on the local labor market).

Several provisions in the Act also reduced food stamp benefits. For example, the maximum per-person food stamp benefit decreased from 103 percent to 100 percent of the Thrifty Food Plan.

People may have felt less inclined to apply for the lowered benefits. Welfare reform may also have indirectly reduced Food Stamp Program participation if, for example, people made ineligible for other welfare programs as a result of the Act incorrectly assumed they were ineligible for food stamps as well. However, we do not know all of the causes of the decline in food stamp



Food stamp recipients in 41 States use plastic debit cards to transfer funds from Federal food stamp benefits accounts to retailers' account.

participation. Other factors in addition to the strong economy and welfare reform may also have contributed to the decrease in food stamp participation.

The decrease in real program expenditures following fiscal 1994 is due in part to the decrease in participation and in part to a decrease in per person food stamp benefits. Real average monthly food stamp benefits per person (in 1999 dollars) decreased from a high of \$82.30 in fiscal 1992 to \$72.29 in fiscal 1999. The size of a household's food stamp benefit is negatively related to its income; that is, lower income households will receive larger food stamp benefits. Therefore, the decrease in real average food stamp benefits since fiscal 1992 may reflect improved economic conditions and higher household incomes. The welfare reform act of 1996 also contributed to this decrease by reducing food stamp benefits.

Another important trend in the Food Stamp Program during the 1990's was the wider adoption of an electronic benefits transfer (EBT) system to distribute food stamp benefits. Under an EBT system, food stamp recipients use a plastic debit card to transfer funds from a Federal food stamp benefits account to a retailer's account. At the beginning of the decade, food stamp benefits were predominantly paper coupons that a household used in approved retail food stores. By the

end of the decade, 41 States (including the District of Columbia) used EBT to some degree, with 31 of these States distributing food stamp benefits entirely through EBT.

An EBT system saves Federal dollars by eliminating printing, transporting, and distributing costs of paper coupons. EBT also improves program integrity because each EBT transaction creates an electronic record that makes fraud easier to detect. The 1996 welfare reform act requires that all States switch to an EBT system to distribute food stamp benefits by October 2002.

School Lunch Program Grows in the 1990's

The National School Lunch Program, the second largest food and nutrition assistance program, provides lunch to children in public schools, nonprofit private schools, and residential child care institutions. Participating schools receive cash and some commodities from USDA to offset the cost of foodservice. In turn, the schools must serve lunches that meet Federal nutritional requirements, and they must offer free or reduced-price lunches to children from low-income families.

The program is available in almost 99 percent of all public schools and in many private schools. Any child at a participating school may enroll in the program. Children from families with incomes at or below 130 percent of the poverty level are eligible for free meals, and those from families between 130 and 185 percent of the poverty level are eligible for reduced-price meals. Children from families with incomes over 185 percent of poverty pay "full" price, though their meals are subsidized to some extent by the program.

Direct certification used to certify children for free school meals began in the early 1990's and increased throughout the decade. Direct certi-

fication, now used in over two-thirds of all school districts, allows school officials to use documentation from State or local welfare offices that indicates that a child's household participates in the Food Stamp Program, the Temporary Assistance for Needy Families (TANF) program, or the Food Distribution Program on Indian Reservations to certify children, thereby eliminating extra paperwork for households.

Real program costs increased by 21 percent during the 1990's, while the total number of meals served under the program increased only 12 percent. School enrollment increased moderately during the 1990's, and the percentage of students in participating schools who participated in the program remained steady at about 57 percent annually throughout the decade.

Costs grew faster than meals served during the decade primarily because more meals were served free or at reduced price, which are more heavily subsidized by USDA than are full-price meals. Free lunches increased from 41 percent in 1990 to 49 percent in 1999, while reduced-price meals increased from 7 percent to 9 percent (fig. 3). The increase in free meals served started at the same time that the number of food stamp recipients increased, and was probably largely the result of the same underlying economic conditions associated with the recession of the early 1990's. Direct certification, which simplified the application process, may have contributed to the increase in free meals. However, unlike the Food Stamp Program—in which participation has been declining since fiscal 1994—the number of free and reduced-price meals served in the National School Lunch Program has continued to increase in recent years despite improving economic conditions. USDA is currently conducting research on the reasons underlying this trend.

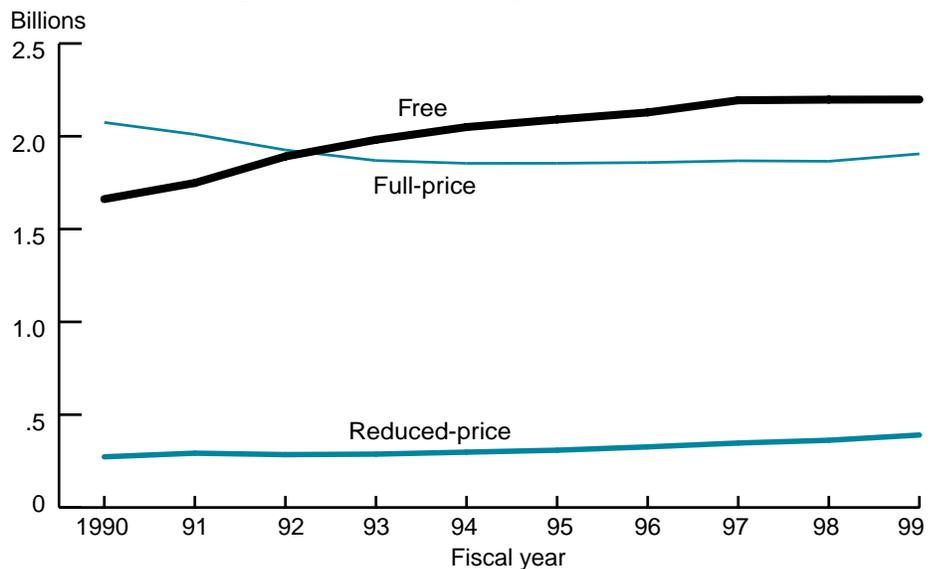
Participation in WIC Levels Off After Dramatic Increases

The WIC program provides nutritious supplemental foods, nutrition education, and healthcare referrals at no cost to low-income pregnant and postpartum women, as well as infants and children up to their fifth birthday, who health professionals determine are nutritionally at risk. To be eligible in most States, household income must fall below 185 percent of the poverty guidelines. WIC food vouchers can be redeemed at retail food stores for specific foods that are rich in the nutrients typically lacking in the target population: iron, protein, calcium, and vitamins A and C. Almost half of all infants born in the United States participate in the program.

Unlike the Food Stamp Program, WIC is a discretionary grant program funded by Congress at a specific level annually. Therefore, the number of participants served each year depends on the annual congressional appropriation and the costs of operating the program. WIC expanded dramatically from fiscal 1990 to fiscal 1997 as a result of increased congressional appropriations, due in part to studies showing WIC's effectiveness. Real program expenditures have stabilized in recent years, as appropriations have leveled off at about \$3.9 billion per year.

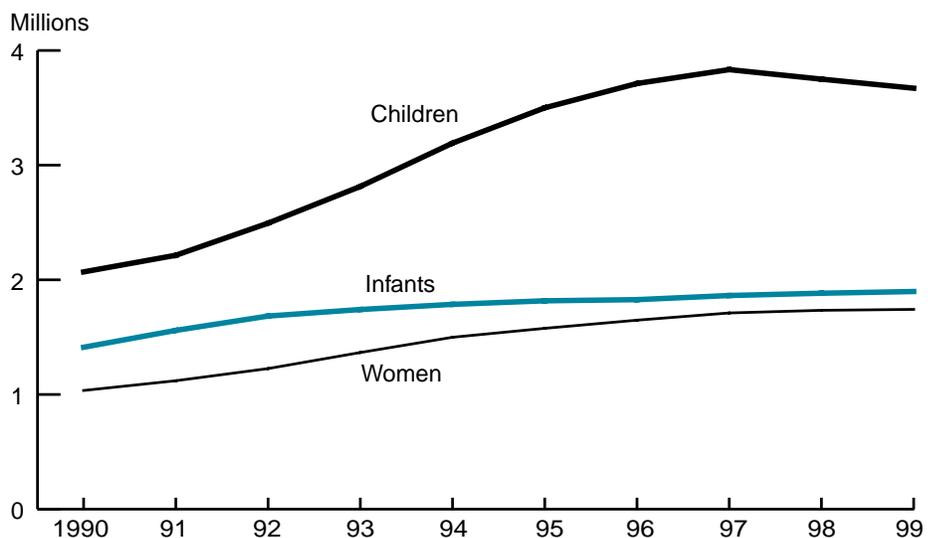
Cost containment practices, primarily rebates from infant formula manufacturers that bid for contracts to be a State's sole WIC supplier of infant formula, have reduced the real average food cost per person and allowed more people to participate in the program. Between fiscal 1990 and fiscal 1997, when WIC participation peaked at an average 7.4 million participants per month, the number of WIC participants increased almost 62 percent (fig. 4).

Figure 3
Number of Free and Reduced-Price Meals Served in the National School Lunch Program Increased During the 1990's



Source: USDA's Food and Nutrition Service.

Figure 4
WIC Participation Levelled Off in the Late 1990's



Source: USDA's Food and Nutrition Service.

The greatest increase was among children (77 percent), followed by women (68 percent), and infants (34 percent). The number of participants decreased slightly, by less than 1 percent, in both fiscal 1998 and fiscal 1999 as funding for WIC leveled off. In fact, fiscal 1998 marked the first decrease in the number of persons

participating in WIC since the program was established in 1974. The small declines in participation in each of the past 2 years was due solely to fewer children participating, as the numbers of women and infants increased slightly.

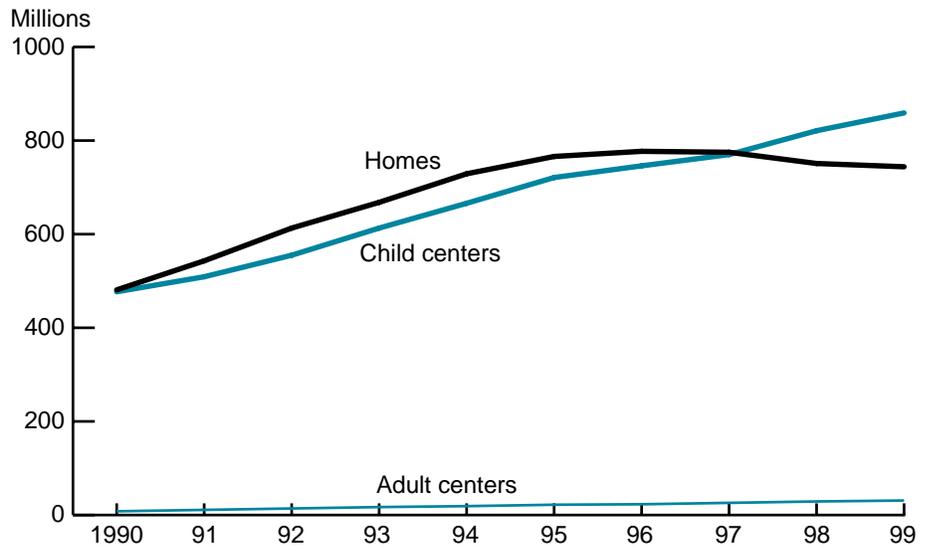
Child and Adult Care Food Program Stabilizes

The Child and Adult Care Food Program provides healthy meals and snacks to children in participating child care centers and family and group daycare homes and to adults in adult daycare centers. The program reimburses participating centers and homes at set per meal amounts and provides them with selected foods. In fiscal 1999, about 1.6 million meals were served under the program, of which almost 53 percent were in child care centers, almost 46 percent in daycare homes, and 2 percent in adult care centers. In centers, children and adults from low-income families are eligible for free or reduced-price meals based on the same eligibility guidelines used in the National School Lunch and School Breakfast Programs.

The welfare reform act of 1996 established two sets of reimbursement rates for providers operating family daycare homes. Those located in low-income areas, or whose own households are low-income, are reimbursed at one rate (tier I), while other daycare home providers are reimbursed at a lower rate (tier II). In tier II homes, meals served to children who are identified as coming from households with income below 185 percent of poverty are reimbursed at the higher tier I rate. Prior to the welfare reform act, Federal subsidy rates for meals and snacks served to children in eligible family daycare homes did not differentiate by the family income of the child, unlike payments to child care and adult care centers.

Real expenditures for the Child and Adult Care Food Program increased 54 percent from 1990 to 1999, making it the decade's second fastest growing program in percentage terms. However, most of this growth occurred from 1990 to 1996

Figure 5
Child and Adult Care Food Program Meals Served in Child-Care Centers Continue To Increase



Source: USDA's Food and Nutrition Service.

when changing demographics, including increased numbers of working mothers, fueled the expansion. After fiscal 1997, expenditures for the program leveled off due in part to the 1996 welfare reform act, which reduced the reimbursement rate for tier II providers. Since the welfare legislation was enacted, the number of child care homes that participate in the program has declined, resulting in fewer meals being served in homes (fig. 5). Meals served in child care centers and adult care centers continued to increase steadily during the decade.

School Breakfast Program Grows Fastest

The School Breakfast Program provides breakfast to school children, with students from low-income families receiving free or reduced-price meals. Eligibility is the same as for the National School Lunch Program. USDA provides schools with cash assistance to offset the cost of foodservice. In return, the school must serve breakfasts that

meet Federal nutrition standards. As an incentive for schools in low-income areas to participate in the program, a school may qualify for higher "severe needs" reimbursement rates if a specified percentage of its meals are served free or at a reduced price and if preparation costs exceed standard reimbursement rates.

School Breakfast Program was the fastest growing nutrition assistance program in the 1990's; real expenditures increased by 74 percent from fiscal 1990 (\$767 million in 1999 dollars) to fiscal 1999 (\$1.3 billion). From fiscal 1990 to fiscal 1999, the total number of meals served in the program increased by 78 percent, and the number of free and reduced-price meals increased by 75 percent. The number of severe-need breakfasts increased by 122 percent, and they accounted for almost 65 percent of all breakfasts served in fiscal 1999. In the late 1980's, Congress enacted legislation to stimulate growth in the program, including legislation that initiated startup

and expansion grants to States. However, the 1996 welfare reform act eliminated these grants as of fiscal 1997, and since that time the program's expansion has slowed.

Despite its dramatic growth over the course of the decade, the School Breakfast Program continues to be much smaller than the National School Lunch Program. It operates in fewer schools—71,700 compared with 96,500 in the lunch program in fiscal 1999—and a much smaller percentage of students in the participating schools participate in the breakfast program compared with the lunch program—20.7 percent versus 57.4 percent. It also serves a larger proportion of free or reduced-price meals. About 85 percent of all breakfasts were free or reduced-price compared with only 58 percent of the meals served under the National School Lunch Program in fiscal 1999.

Future Nutrition Education Strengthened

As the new century begins, total expenditures for food and nutrition assistance (in both real and nominal terms) are declining, largely as the result of the contraction of the Food

Stamp Program. Expenditures for the WIC and Child and Adult Care Food Programs have stabilized in recent years, while the School Breakfast Program and, to a lesser degree, the National School Lunch Program, are continuing to expand. However, these trends could change in years to come, as economic, legislative, and demographic changes affect the programs. For example, a downturn in the country's economy could result in an increased demand for food stamps and an increase in total expenditures for nutrition assistance.

One trend increasingly evident during the 1990's most likely to continue is the integration of nutrition education into the assistance programs. For example, in the Food Stamp Program, States have the option to develop nutrition education plans that can be reimbursed by USDA for 50 percent of State and local costs to provide the education. The number of States with approved nutrition plans increased from 7 in fiscal 1993 to 46 in fiscal 1999. In the WIC program, States are required to spend a specified share of their funding on nutrition education. USDA's child nutrition programs, including the National School Lunch and School Breakfast Pro-

grams, also contain nutrition education components.

In a recent report to Congress, USDA's Food and Nutrition Service stated that the objective for nutrition education is to use the nutrition assistance programs' ability to reach low-income people with nutrition education interventions that effectively change behaviors and improve diets. The Food and Nutrition Service recommended that nutrition education be an integral component of all nutrition assistance programs. Additional nutrition education might increase future program costs slightly, if other factors are constant.

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Nutrition Policy in the 1990's

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Scientific research increasingly confirms that a healthful diet reduces the risk of developing chronic diseases. Many groups, including the food industry, voluntary organizations (like the American Heart Association), and Federal and local government agencies, either independently or cooperatively, have stepped in to accelerate the trend toward healthful eating by promoting eating patterns that conform to Federal recommendations. These efforts have focused on providing nutrition information and education to persuade and guide Americans to consume more healthful diets, and/or directly altering the nutrient content of foods or meals.

Many Americans seem to have heard the message. High interest in nutrition during the 1990's prompted the food industry to step in with products and information to help Americans choose healthful foods. Evidence suggests that some Americans are changing their diets and moving closer to recommendations by nutritionists and other health professionals. However, changes vary considerably, both for individuals and food groups. For

example, USDA food consumption surveys show that fat intake as a percentage of total calories has declined in the last decade—a move in the right direction. The same surveys, however, show that people are not increasing their consumption of fruits and vegetables as recommended, and that the number of obese Americans is rising.

Dietary Guidelines Evolve Over the Decade

The *Dietary Guidelines for Americans* serve as the focal point for the Federal Government's nutrition messages and interventions. Since 1980, the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS) have jointly revised and published the *Dietary Guidelines* every 5 years. In 1990, DHHS and USDA released the third edition of the *Dietary Guidelines*. For the first time, numerical recommendations were made for intakes of dietary fat and saturated fat. *The Dietary Guidelines* advised that 30 percent or less of calories should come from fat, and less than 10 percent of calories should come from saturated fat. Consumers were advised to enjoy a healthy diet through eating a variety of foods and enjoying foods in moderation, instead of emphasizing dietary restrictions. For example,

instead of "avoid too much sugar," the 1990 *Dietary Guidelines* said "use sugars only in moderation" (table 1).

The language was changed in 1995 to be more positive. The 1995 edition of the *Dietary Guidelines* emphasized the word "choose." For example, "use sugars only in moderation" became "choose a diet moderate in sugars." The 1995 edition also mentions physical activity, and continues a move away from the original 1980 recommendation to "maintain ideal weight" with "balance the food you eat with physical activity; maintain or improve your weight."

Food Guide Pyramid Advises Healthier Choices

The Food Guide Pyramid, released in 1992, was developed to help consumers translate the *Dietary Guidelines* and Recommended Dietary Allowances into actual food choices. The Pyramid graphically represents what constitutes a good diet, and both professionals and the public are aware of and widely recognize the Pyramid.

In addition to use within the Federal Government, food companies and associations, media, educators, and others in the private sector use

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Table 1

Dietary Guidelines Change Over Time

1980	1985	1990	1995	2000
Eat a variety of foods.	Eat a variety of foods.	Eat a variety of foods.	Eat a variety of foods.	Let the Pyramid guide your food choices.
Maintain ideal weight.	Maintain desirable weight.	Maintain healthy weight.	Balance the food you eat with physical activity: maintain or improve your weight.	Aim for a healthy weight. Be physically active every day.
Avoid too much fat, saturated fat, and cholesterol.	Avoid too much fat, saturated fat, and cholesterol.	Choose a diet low in fat, saturated fat, and cholesterol.	Choose a diet low in fat, saturated fat, and cholesterol.	Choose a diet that is low in saturated fat and cholesterol and moderate in total fat.
Eat foods with adequate starch and fiber.	Eat foods with adequate starch with and fiber.	Choose a diet with plenty of vegetables, fruits, and grain products.	Choose a diet with plenty of grain products, vegetables, and fruit.	Choose a variety of grains daily, especially whole grains. Choose a variety of fruits and vegetables daily.
Avoid too much sugar.	Avoid too much sugar.	Use sugars only in moderation.	Choose a diet moderate in sugar.	Choose beverages and foods to moderate your intake of sugars.
Avoid too much sodium.	Avoid too much sodium.	Use salt and sodium only in moderation.	Choose a diet moderate in salt and sodium.	Choose and prepare foods with less salt.
If you drink alcohol, do so in moderation.	If you drink alcoholic beverages, do so in moderation.	If you drink alcoholic beverages, do so in moderation.	If you drink alcoholic beverages, do so in moderation.	If you drink alcoholic beverages, do so in moderation.
NA	NA	NA	NA	Keep food safe to eat.

NA = Not applicable.

Source: USDA/DHHS, *Nutrition and Your Health: Dietary Guidelines for Americans*, 1980, 1985, 1990, 1995, 2000.

the Pyramid. Publishing companies, for example, have updated high school and college nutrition textbooks to include the Pyramid. Trade associations—such as the Wheat Foods Council, National Pasta Association, and the USA Rice Council—have used the Pyramid in their nutrition education materials aimed at the public. The Food Guide Pyramid graphic is appearing more frequently on food packaging, especially boxes of cereal, graham crackers, and other grain products.

The Pyramid has been adapted for the dietary needs of different

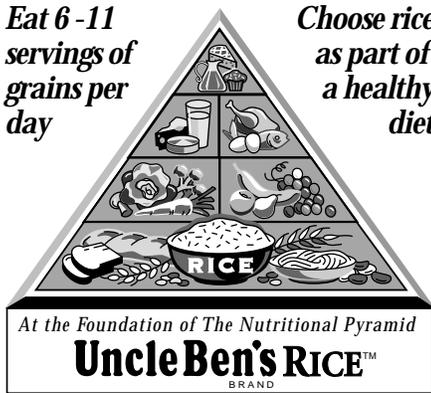
groups of Americans. USDA released a special version of the Pyramid, which makes recommendations for healthy eating by children ages 2 to 6 in 1999. The children's Pyramid recommends the lower number of servings in each "block" and simplifies the names of each group. For example, the "Bread, Cereal, Rice and Potato Group" in the standard Pyramid became the "Grain Group" in the children's version, and the number of recommended servings simplified from 6 to 11 servings to 6.

Nutrition Labels Provide More Information to Consumers

The Nutrition Labeling and Education Act (NLEA), enacted in 1990, proposed to heighten awareness of the nutritional makeup of foods and to encourage food manufacturers to improve the nutrition of their products. The resulting nutrition labeling regulations, which became fully effective in mid-1994, provide consumers with an unprecedented amount of nutrition information on

Eat 6-11 servings of grains per day

Choose rice as part of a healthy diet



Many food companies are using the widely recognized Food Guide Pyramid to promote the role of their company's products in a healthy diet.

virtually all processed foods.

Required information includes total calories, calories from fat, saturated fat, cholesterol, sodium, total carbohydrates, dietary fiber, sugars, protein, and certain vitamins and minerals. The regulations also established guidelines to promote voluntary labeling about nutrition of raw, single-ingredient meat and poultry products.

The Nutrition Facts label may have been one of the most tumultuous changes the food industry has ever faced. For the first time, consumers received standardized nutritional information on all packaged foods that enabled consumers to quickly and easily compare the nutritional contents of foods to make informed choices. Food companies began reformulating products to compete for nutrition-conscious consumers' food dollars.

A Food Marketing Institute consumer survey conducted in early 1995 indicated that the label may effect some dietary change. Of those who had seen the label (43 percent of the shoppers interviewed), 22 percent indicated it had caused them to start buying and using food products they had not used before, and 34 percent said they had stopped buying products they once purchased regularly. Another sur-

vey, conducted under the auspices of the American Dietetic Association, indicated that 56 percent of interviewees claimed they modified their food choices, using this new labeling information.

Five-A-Day Campaign Promotes Eating Fruits and Vegetables

In 1992, the National Cancer Institute and the Produce for Better Health Foundation initiated the national "Five-a-Day for Better Health" campaign with the aim to increase Americans' fruit and vegetable consumption to at least five servings a day by the year 2000. The program included a national media campaign (newsletters to editors of food columns, public service announcements), point-of-purchase activities in supermarkets, and community education efforts. National Cancer Institute studies indicated that in 1991, just 8 percent of American adults thought they should eat five or more servings of fruits and vegetables each day, but by 1997, 38 percent of Americans believed they should eat five or more servings of fruits and vegetables each day.

Americans seem to be trying to follow through on their good intentions. A food consumption survey by USDA in 1994-6 indicated that the average daily intake of vegetables was 3.4 servings and that of fruits was 1.5 servings.

Other Efforts Target the Nutrient Contents of Foods...

A second method to promote healthful diets involves changing the nutritional composition of foods. This method does not require consumer knowledge, understanding, or commitment to change food consumption behavior, but instead involves the Federal Government

and the food industry in improving the nutritional composition of the foods themselves. Food companies, seeking to differentiate their products from those of competitors, began adding vitamins to foods (in the form of powders and liquids) soon after their discovery in the 1910's and 1920's. (Fortification of foods was not common until lower cost, synthetic vitamins and minerals were developed in the late 1930's.) Companies continued to use nutrition as a marketing tool in the 1990's, adding nutrients to a variety of foods, such as calcium-fortified breakfast cereals and orange juice.

In the 1940's, the Federal Government set minimum and maximum levels for three B-vitamins (thiamine, niacin, and riboflavin) and iron for breads, rolls, and other grain products claiming to be "enriched." Other foods and nutrients also have government-established standards for fortification and enrichment. In 1998, the Government began requiring all enriched grain products to be fortified with folic acid, to reduce the risk of some birth defects.

...And Meals

Federal programs that provide meals to specific populations have been revised to ensure that, in addition to providing a certain proportion of the recommended dietary allowances for energy, vitamins, and minerals, the meals are consistent with *Dietary Guidelines* recommendations of choosing a diet with plenty of grain products, vegetables, and fruits, and a diet low in saturated fat and cholesterol, and moderate in total fat.

Improving the nutritional quality of meals served in various Federal nutrition programs is part of efforts by government and public health organizations to improve food choices among target populations and educate participants and their

families, showing that meals can be healthful and tasty.

School nutrition programs provide a good opportunity to improve the diet quality of the Nation's school children. USDA oversees a number of programs—including the National School Lunch Program and the School Breakfast Program. At its inception in the late 1940's, the National School Lunch Program was developed to provide balanced meals by focusing on minimum amounts of four specific components (meat, bread, vegetables/fruit, and milk) rather than on the nutrient content of the entire meal. USDA requires that breakfasts and lunches served in these programs meet both specific food and nutrition guidelines for school systems to qualify for USDA reimbursement and commodities.

A 1992 study showed that school lunches and breakfasts did not reflect current scientific knowledge about diet. School lunches exceeded the *Dietary Guidelines* recommendations for fat and saturated fat. Children who ate the school lunch consumed a higher amount of calories from fat than children who brought lunch from home or bought lunch from vending machines or elsewhere at school.

In November 1994, Congress enacted a law changing the nutrition criteria for reimbursable school meals by adding the requirement that meals be consistent with the nutritional guidance outlined in the

Dietary Guidelines for saturated fat and total fat, to the longstanding goals of providing meals to meet established values of the Recommended Dietary Allowances for key nutrients and for calories. The law required schools to use one of five food- and nutrient-based menu planning systems, and to be in compliance by the first day of the school year 1996-97.

The new school meals menu is expected to reduce overall intake of fat and saturated fat among school-age children. Further, since school meal participation rates are higher for low-income children, health benefits from improved school meals help the population that is at greatest risk of anemia, obesity, and other nutrition-related chronic diseases.

The Head Start program also provides a vehicle to promote healthful foods and diets. Head Start delivers comprehensive services in the areas of education/early childhood development, medical, dental, mental health, and nutrition to foster healthy development in low-income children. Head Start served approximately 822,000 children and their families in fiscal 1998. Children in the program are served a minimum of one hot meal and snack each day that, combined, meet at least one-third of the recommended dietary allowances for energy, vitamins, and minerals for children ages 3 to 5. USDA provides Head Start with commodities and cash. The 1994 Head Start Act requires Head Start

centers to add fruit or vegetables to the snack, not to serve overly sweet and sticky foods, to attempt to reduce the amount of fat in recipes and in food preparation, and to provide foods that do not need added salt.

Other programs target the dietary needs of America's seniors. DHHS provides grants to State agencies for USDA's Nutrition Program for the Elderly to support congregate and home-delivered meals to people 60 years and over. USDA provides commodities or cash in lieu of commodities for each meal served. In fiscal 1998, about 114 million meals were served to 1.9 million elderly people in a collective setting, and 129.6 million home-delivered meals were served to 894,000 older people.

Meals served as part of the Nutrition Program for the Elderly must provide a minimum of one-third of an elderly person's Recommended Dietary Allowances for vitamins, minerals, protein, and food energy if the project provides one meal a day, two-thirds if two meals, and 100 percent if three meals. In 1993, Congress enacted legislation that required States to ensure that program meals complied with the *Dietary Guidelines*.

Consumers and the Food Industry Respond

Consumers' attitudes about nutrition have changed over the past decade. The Food Marketing Insti-

Table 2
Consumers Became Concerned About Fat Content in the 1990's

Question: "What is it about the nutritional content (of foods) that concerns you the most?"

Concern	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	<i>Percent</i>											
Fat content	27	29	46	42	50	54	59	65	60	56	59	50
Salt/sodium content	26	25	30	22	21	26	18	20	28	23	24	16
Cholesterol	22	38	44	37	30	23	21	18	26	20	20	18
Nutritional value	14	8	6	8	5	10	4	8	6	11	12	17
Sugar content/less sugar	20	15	16	12	13	18	14	15	12	11	12	9

Source: Food Marketing Institute.

tute has surveyed food shoppers for many years, asking about issues related to food choices. Consumers were equally concerned about fat content, salt/sodium content, and cholesterol in the early 1990's (table 2). Information about the importance of decreasing the fat in our diets seems to have affected consumers because the share of interviewees citing fat content as the nutritional issue of greatest concern rose to 65 percent in 1995, before decreasing to 50 percent in 1999. The share of consumers who cite cholesterol as the most important concern rose to 44 percent in 1990, but decreased throughout the decade to 18 percent in 1999. Those citing sugar content as a primary concern fell from 20 percent in 1988 to 9 percent in 1999.

The food industry has responded to changing consumer attitudes, particularly concern about fat content of foods. Meat producers, for example, have responded by producing leaner products. Since the 1980's, the average cuts of beef and pork have slimmed down in fat content by roughly 30 percent. Producers are breeding leaner herds, feeding animals less fattening diets, and taking them to market earlier (the

younger the animal, the lower the fat content).

According to food industry sources, development of reduced-fat food products tops the list for research and development investments. For example, 2,076 new food products introduced in 1996 claimed to be reduced in fat or fat free—nearly 16 percent of all new food products introduced that year, and more than twice the number just 3 years earlier (table 3). In the past few years, however, the number of reduced- or low-fat products fell to 481 by 1999. The market for reduced- or low-fat foods might be saturated, or producers may have noted consumers' decreasing concerns about fat content.

Further down the marketing chain, retailers are also adopting procedures that reflect nutrition concerns and encourage healthful eating practices. Retailers now offer consumers three or four kinds of ground beef with varying fat content. Similarly, food stores' array of fruits and vegetables available has increased to accommodate consumers' growing interest in healthful eating and ethnic cuisines. Most supermarkets now have salad bars

and a variety of packaged, ready to eat salads.

New Dietary Guidelines Broaden the Nutrition Message

In May 2000, new *Dietary Guidelines for Americans* were released containing 10 recommendations, instead of the 7 in earlier editions (table 1). For the first time, the *Dietary Guidelines* specifically recommend exercise and physical activity, advising Americans to "Be physically active each day." The new *Dietary Guidelines* also include for the first time a food safety recommendation to "Keep food safe to eat."

The 2000 *Dietary Guidelines* give greater detail and emphasize explicit recommendations for particular nutrients and foods. Fat intake recommendations now differentiate among total fat, saturated fat, and cholesterol, calling for a diet "low in saturated fat and cholesterol and moderate in total fat." The 1995 guideline recommending a diet with plenty of grains, vegetables, and fruits is now separated into two distinct recommendations. The guide-

Table 3
Introduction of New Reduced- and Low-Fat Foods Peaked in 1996

Claim ¹	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<i>Number of new food products</i>										
Reduced/low calorie	1,165	1,214	1,130	609	575	1,161	776	742	456	302
Reduced/low fat	1,024	1,198	1,257	847	1,439	1,914	2,076	1,405	1,180	481
Reduced/low salt	517	572	630	242	274	205	171	87	80	97
Low/no cholesterol	694	711	677	287	372	163	223	106	124	244
Reduced/low sugar	331	458	692	473	301	422	373	78	164	74
Added/high fiber	84	146	137	51	26	40	12	33	43	67
Added/high calcium	20	15	41	14	23	21	35	28	45	119
Total new food products ²	10,329	12,412	12,347	12,925	15,016	16,890	13,287	12,483	11,065	9,814

¹Nutrient claims are not additive, as new products may carry more than one claim.

²Includes pet foods.

Source: *New Product News*, Global New Products Database.

line for salt intake now specifically calls for lower salt intake and emphasizes food sources of sodium rather than salt added at the table as a source of dietary sodium. Regarding sugar, the new *Dietary Guidelines* reflect a growing concern about added sugars in beverages: "Choose beverages and foods to moderate your intake of sugars."

USDA Proposes New Nutrition Labeling for Fresh Meat and Poultry

On May 30, 2000, USDA's Food Safety and Inspection Service (FSIS) announced a proposal to require nutrition labels on fresh meat and poultry. Such a label would provide consumers with the same type of information provided for processed foods, such as fat and cholesterol content, calories, and percent of calories from fat. The goal is to help consumers make better-informed food choices by allowing them to easily and accurately compare nutrition contents of fresh meats.

When FSIS published its final nutrition labeling rule in 1993, the agency required labels only on processed foods that vary in composition by manufacturer and brand, such as hot dogs, luncheon meats, and sausage. Nutrition labeling for raw single ingredient products, like chicken breasts, hamburger, and steak, was encouraged on a voluntary basis. FSIS said at the time that it would monitor adoption of voluntary labeling every 2 years, beginning in 1995. If 60 percent of the fresh meat and poultry sold did not carry nutrition information, the agency would initiate a mandatory program. Surveys show a participation rate below this goal, and the agency has found that the nutrient

and fat content of ground or chopped products varies enough that consumers cannot make informed comparisons.

Under the proposed rule, the label for fresh meat and poultry would use the same "Nutrition Facts" format used for processed meat and poultry products. Nutrition information could either be placed on a package label or be displayed at the point of purchase. For example, retailers may choose to display information in the meat section of a grocery store listing nutrition information for typical cuts of popular meat products, rather than on a label applied to each package. Fresh foods regulated by the Food and Drug Administration (fruits, fish, and vegetables) are also under a voluntary nutrition labeling program.

Federal nutrition policies have evolved over the past decade, reflecting increasing awareness of complex relationships between diet choices and health. Developments in nutrition during the last decade have helped the Nation progress in the goal of ensuring a healthy, well-nourished population. However, challenges remain, particularly regarding the nutritional needs of the elderly and children. As the Nation ages, nutritional needs of the elderly population become increasingly important. Future nutrition research and education efforts will also focus on what has been called the "epidemic" of childhood obesity.

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Food Safety Efforts Accelerate in the 1990's

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Awareness of the health risks from foodborne disease has increased over the past 10 years. Although the Nation's food supply remains among the safest in the world, widely publicized outbreaks of foodborne illness caused by such sources as *Escherichia coli* (*E. coli*) O157:H7 in hamburger, *Listeria monocytogenes* in hot dogs, and *Salmonella* in poultry and eggs have raised the public's concerns about risks from microbial pathogens in food.

The Federal Government and the private sector have responded with a variety of efforts to protect and enhance the safety of the foods we eat. This article reviews the important events in food safety of the last decade and looks ahead at new efforts to reduce microbial contamination of foods.

Foodborne Illness Outbreak Raises Concern and Action

In 1993, an outbreak of foodborne illness attributed to *E. coli* O157:H7 in undercooked hamburgers from fast-food restaurants in several western States led to 700 illnesses and 4 deaths. Although not the largest outbreak of foodborne illness

in the Nation's history, it had an important impact on public awareness of the risks from microbial pathogens. The outbreak received wide publicity because the source of the illness was a frequently consumed food (hamburgers) and because children were particularly susceptible.

The Federal Government responded in several ways. The Food and Drug Administration (FDA) raised the recommended internal temperature to which restaurants cook hamburgers to 155° F. USDA's Food Safety and Inspection Service (FSIS) responded by declaring *E. coli* O157:H7 an adulterant in raw ground beef and implementing a sampling program to test for the pathogen in raw ground beef prepared in federally inspected establishments and in retail stores. FSIS also required a label with safe food handling instructions be placed on consumer packages of raw meat and poultry. The label emphasizes cooking foods thoroughly, storing foods in the refrigerator, discarding leftovers if not refrigerated immediately, and washing surfaces, utensils, and hands after touching raw meat or poultry. USDA also responded with an information campaign in schools to alert children not to eat hamburgers that are still pink inside after cooking. This advice was subsequently changed due to new scientific findings, and consumers are now encouraged to use

food thermometers to ensure that hamburgers reach an internal temperature of 160° F.

Food Inspection Systems Are Modernized

Increasing concerns about foodborne illnesses linked to microbial pathogens in meat and poultry accelerated efforts to modernize and strengthen the Nation's meat and poultry inspection system. Since the turn of the century, national food safety laws have required inspection of all carcasses and meat products in interstate commerce; poultry was added in 1957. Inspection ensured meat and poultry products were sound, healthful and wholesome, with no dyes, chemicals, preservatives, or ingredients that would render products unfit for people to eat.

In federally inspected meat and poultry slaughterhouses, FSIS conducted a labor-intensive examination of each carcass, its lymph nodes, and its internal organs. If there was no evidence of disease, the animal was considered suitable for human consumption. In all meat and poultry establishments, inspectors also checked the operation of equipment (such as verifying refrigeration and cooking temperatures); oversaw plant sanitation during processing and cleanup; and in processing plants, inspectors checked labels, product net weight, and the

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ingredients used in making the products.

This inspection system removed diseased animals from the food supply and enforced sanitary standards in slaughter and processing, but a serious gap remained. Today, we know that some human pathogens live in the gastrointestinal tract of food animals without harming them. The former inspection system relied largely on organoleptic (sensory) methods—sight, smell, and sense of touch—to identify unsafe products. This method of inspecting raw meat and poultry missed microbial pathogens, such as *E. coli* O157:H7 or *Salmonella*, that did not cause illness in animals.

To close this gap, FSIS strengthened the meat and poultry inspection process. On February 3, 1995, FSIS published a proposal for a new inspection system for all federally inspected meat and poultry plants. The new system was implemented in stages. By January 1998, plants with more than 500 employees, which slaughter 75 percent of U.S. meat and poultry, were using the new system. Plants with 10 to 500 employees came under the new regulations in January 1999. Very small establishments, those with fewer than 10 employees or annual sales of less than \$2.5 million, had until January 2000 to comply.

The new system required all regulated plants to adopt Hazard Analysis and Critical Control Points (HACCP) procedures. Plants had to develop HACCP plans to monitor and control production operations. Plants first identify food safety hazards and critical control points in their production, processing, and marketing activities. Plants then establish critical limits, or maximum or minimum levels, for each critical control point. Finally, plants develop monitoring procedures to ensure the critical limits are met.

HACCP includes steps for record-keeping and verification, including some microbial testing of meat and

poultry products to ensure that the system meets the target level of safety. Plants and FSIS share responsibility for verifying the effectiveness of the HACCP system. FSIS tests for *Salmonella* on raw meat and poultry products, and slaughter plants test for generic *E. coli* on carcasses. Another component of the new system requires federally inspected meat and poultry plants to develop written sanitation standard operating procedures to show how they meet daily sanitation requirements.

USDA's Economic Research Service (ERS) conducted a benefit/cost analysis of the new inspection system. The estimated savings in medical costs and productivity losses due to prevention of foodborne illnesses caused by four microbial pathogens (*E. coli* O157:H7, *Salmonella*, *Listeria monocytogenes*, and *Campylobacter*) were compared with the Federal and industry costs involved with assessing and developing control procedures, antimicrobial treatments, recordkeeping, employee training, and microbial testing. ERS found that the public health benefits of the new system, even under low-range assumptions about the effectiveness of the rule, were greater than its costs.

New Regulations Cover Seafood and Juice

In December 1995, FDA announced a rule requiring seafood processors to identify hazards that, without preventive controls, are reasonably likely to affect the safety of seafood products. If at least one such hazard can be identified, the seafood firm is required to adopt and implement an appropriate HACCP plan. In addition to helping ensure that seafood products are free of contaminants, this process helps processors who subsequently have food safety problems determine how and when those problems could have occurred. Seafood pro-

cessors using a HACCP plan continue to be monitored under FDA surveillance and inspection programs. This rule was implemented in stages, with complete implementation effective in late 1997.

Outbreaks of foodborne illness associated with contaminated fruit juices led to new safety rules for juices. In October 1996, at least 66 people in the Western United States and Canada became ill after drinking unpasteurized apple juice contaminated with *E. coli* O157:H7. In response, FDA proposed regulations to increase the safety of fresh and processed juices. Initially, in 1998, FDA began requiring warning labels on all unpasteurized juice or juice not otherwise treated to control illness-causing pathogens. The labels allow consumers to avoid unpasteurized or untreated juices, thereby lessening risk. On January 18, 2001, FDA published final regulations requiring that all domestic and foreign fruit and vegetable processors use HACCP procedures to prevent, reduce, or eliminate hazards in juices. Depending on size, companies have 1 to 3 years to implement HACCP programs. Processors must continue to use the previously required warning label statement until they implement HACCP programs.

Food Safety Initiatives Bring New Resources

On January 25, 1997, President Clinton announced the National Food Safety Initiative, a multi-agency effort to strengthen and improve food safety in the United States. The initiative included several new programs to promote food safety, including improved inspection and preventive systems, such as HACCP, new tests to detect pathogens, and increased funding for FDA inspections and for food safety research. This research would include ways to assess risks in the food supply, improve response to

foodborne illness outbreaks, and improve coordination among the Federal agencies responsible for food safety.

The initiative established a national educational campaign for safer food handling practices in homes and retail outlets. The Fight BAC!™ campaign is the product of the Partnership for Food Safety Education, a unique public-private partnership of industry, Government, and consumer groups dedicated to increasing the awareness of food safety and reducing the incidence of foodborne illness. This education effort augmented efforts by farmers, processors, and retailers to reduce risk of foodborne hazards. Through this public education campaign, a focused and more unified program is available to consumers, who share in the responsibility of safe food handling. The core message of the Fight BAC!™ campaign is similar to the food handling message for meat and poultry:

- 1) Clean: Wash hands and surfaces often.
- 2) Separate foods: Don't cross-contaminate.
- 3) Cook: Cook to proper temperatures.
- 4) Chill: Refrigerate foods promptly after cooking.

This campaign has been implemented in brochures, outreach efforts, TV and radio spots, and through the Internet. This campaign is very successful and widely used in schools.

In the past few years, there have been some highly publicized cases of foodborne disease outbreaks linked to fruits and vegetables, and some linked to imported foods. In response, the Clinton Administration announced the Produce and Imported Food Safety Initiative on October 2, 1997. This initiative aimed to upgrade domestic food safety standards and to strengthen domestic inspection and food safety



systems in foreign countries to ensure that foods coming from overseas are as safe as those produced at home. The initiative enhanced FDA oversight for imported foods, improved inspection activities abroad, and provided guidance about good agricultural and manufacturing practices.

FoodNet System Increases Scientific Knowledge

The early-warning surveillance system called FoodNet was established in 1996 to monitor illness due to foodborne pathogens in five areas around the country. FoodNet is a joint effort by the Centers for Disease Control and Prevention (CDC), USDA, FDA, and State health departments to capture a more accurate and complete picture of foodborne illness trends and to gather data necessary to prevent outbreaks.

In 1997, FoodNet was expanded to monitor illness due to nine pathogens in eight sites: Connecticut, Georgia, Minnesota, Oregon, and selected counties in California, Maryland, New York, and Tennessee. In 2000, additional counties in Tennessee were added to the FoodNet surveillance area. The program currently surveys a population of 29 million people. Colorado will join FoodNet surveillance in 2001.

The FoodNet surveillance system has led to a more comprehensive assessment of the scope and extent of foodborne disease in the United States. Using surveillance data from FoodNet, researchers in 1999 estimated that foodborne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,200 deaths in the United States each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths. Unknown agents account for the remaining illnesses, hospitalizations, and deaths. Three pathogens, *Salmonella*, *Listeria monocytogenes*, and *Toxoplasma*, are responsible for 1,500 deaths each year. ERS has used these new estimates of the number of cases and deaths to revise its estimate of the annual costs of foodborne disease (see box).

The 1999 FoodNet data suggest that foodborne diseases cause more illnesses but fewer deaths than previously thought. CDC estimated in 1994 that 6 million to 33 million cases of foodborne illness occur each year, resulting in 4,000 to 9,000 deaths.

Data from the last few years show that private and public efforts to promote safer food are beginning to show results. Due in part to the implementation of HACCP systems in meat and poultry processing, progress is being made in reducing the presence of microbial pathogens in the food supply. Data from USDA show a reduction of up to 50 percent in *Salmonella* in meat and poultry in recent years. Preliminary data from CDC show a decline in the incidence of several foodborne diseases. FoodNet data show that from 1997 to 1999, illness from the most common bacterial foodborne pathogens declined nearly 20 percent. This decline represents at least 855,000 fewer Americans each year suffering from foodborne illness caused by bacteria since 1997. Between 1998 and 1999, the data show a 25-percent decline in the number of *E. coli* O157:H7 infections, although there

are year-to-year fluctuations in the number of infections and it may be too early to tell if this represents a permanent decline. The data also show a 41-percent drop in the incidence of *Shigella* infections and a 19-percent decline in the number of illnesses caused by *Campylobacter*.

The incidence of infections by *Salmonella* Enteritidis, a serotype of *Salmonella* infection often associated with egg consumption, declined 7 percent during 1998-99, according to the FoodNet data. However, overall incidence of *Salmonella* infection increased from 1998 to 1999, due to several large outbreaks of salmonellosis from other sources, including unpasteurized orange juice, imported mangos, and raw sprouts.

Possible Future Direction for Meat and Poultry Safety

Government and industry continue to look for ways to increase the safety of our foods. Several techniques are being explored, including irradiation. Irradiation, a process that exposes products to ionizing radiation, can control or reduce microbial pathogens that may cause foodborne disease. Use of this technology on foods requires approval by FDA. FSIS must also approve its use on meat and poultry. FDA approved the use of irradiation to control microbial pathogens on poultry in 1990 and on meat in 1997. USDA granted its approvals in 1992 and 1999.

Although scientific evidence indicates that irradiation is safe and effective for these uses, few processors or retailers offered irradiated foods during the 1990's. Many food processors and retailers were concerned that some consumers would not buy irradiated foods. Retailers and processors were also reluctant to supply such foods for fear of boycotts by groups opposed to food irradiation.

Limited markets for irradiated poultry developed in the mid-1990's, primarily selected hospitals and nursing homes feeding people at risk for foodborne disease, such as the elderly. Huisken Meats, a Minnesota-based food manufacturer, began marketing irradiated hamburger patties in the Minneapolis-St. Paul area in May 2000, and other firms have since introduced irradiated beef products in additional markets.

Still, the potential for widespread use of irradiation is uncertain. Surveys of consumers in the FoodNet sites indicate that about half of consumers questioned had heard about food irradiation, and that about half would buy irradiated meat or poultry. Education about the potential benefits of irradiation might promote consumer acceptance. According to the FoodNet survey, the most frequent reason respondents gave for not being willing to buy irradiated meat or poultry was "insufficient information" about food irradiation.

Action Plan Announced for Egg Safety

The safety of eggs and egg products remains a concern, particularly the risk of human infection from *Salmonella* Enteritidis. Each year, 100,000 to 150,000 cases of foodborne illnesses are caused by *Salmonella* Enteritidis from shell eggs. A comprehensive risk assessment by USDA in 1998 estimated that of the 47 billion shell eggs consumed annually, 2.3 million are *Salmonella* Enteritidis-positive, exposing a large number of people to the risk of illness. The risk assessment also determined that 8 percent of egg-transmitted *Salmonella* Enteritidis illnesses could be avoided if all eggs are refrigerated at 45° F throughout processing and distribution.

On November 30, 2000, FDA issued a regulation requiring safe handling labels on untreated shell

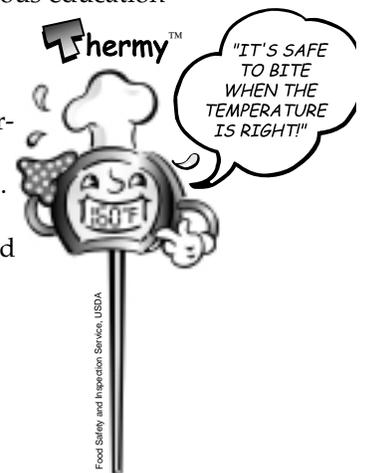
eggs. The regulation also required that, when held by retail establishments, shell eggs be stored and displayed at a temperature of 45° F or lower.

The risk assessment also concluded that a broadly based, 'farm-to-table' approach to reduce risks from *Salmonella* Enteritidis could potentially achieve a 25-percent reduction in human illnesses from this pathogen. Controlling pathogens at the farm level, holding eggs at proper temperature during transport and sale, and safe handling by consumers can all help prevent salmonellosis.

In August of 1999, the President's Council on Food Safety announced an Egg Safety Action Plan. The plan set goals of a 50-percent reduction in egg-associated *Salmonella* Enteritidis illnesses by 2005 and the eventual elimination of *Salmonella* Enteritidis in eggs as an important source of human illness by 2010, through science-based and coordinated regulation, inspection, enforcement, research, and education programs.

New Educational Efforts Underway

Along with farmers, processors, retailers, and foodservice workers, consumers are integral to improving food safety. In May 2000, USDA took two steps to increase consumer awareness of the importance of food safety and to encourage safe food handling and preparation behavior. On May 25, USDA launched a national campaign to promote the use of food thermometers in the home. Previous education stressed the importance of thorough cooking, particularly of hamburgers. Consumers were advised to cook



ERS Updates Foodborne Illness Costs

Using revised estimates of the annual number of foodborne illnesses in 1998 released by CDC in September 1999, ERS updated foodborne illness costs for four major pathogens: *Campylobacter* (all serotypes), *Salmonella* (nontyphoidal serotypes only), *E. coli* O157:H7, and *Listeria monocytogenes*. The new estimates of the number of cases, hospitalizations, and deaths from these foodborne pathogens were derived, in part, from data gathered by the FoodNet surveillance system. For the first time, ERS also included the costs due to other Shiga toxin-producing strains of *E. coli*, collectively known as *E. coli* non-O157:H7 STEC. ERS estimates that the annual economic costs of medical care, productivity losses, and premature deaths due to foodborne illnesses caused by these five pathogens are \$6.9 billion (see table next page).

Along with new data on illnesses, cases, and deaths, ERS also revised the methodology for valuing premature deaths. In the past, ERS valued a premature death by using a "risk premium" revealed by labor market studies of the higher wages paid to

people employed in high-risk occupations. This single value was applied to all premature deaths, regardless of the age at which the death occurred. The value of a premature death was \$6.5 million in August 2000 dollars. Using new data on the age distribution of deaths caused by the five pathogens, ERS now adjusts the economic cost of premature deaths to account for age at time of death. Under the age-adjusted approach, the assumed cost of each death ranges from \$8.9 million for a child who dies before his or her first birthday to \$1.7 million for a person who dies at age 85 or older.

Because the five microbial pathogens have different health outcomes for different age groups, adjusting for the age of death raises the cost of some foodborne illnesses and lowers the cost of others. For example, the annual cost of foodborne illnesses caused by *Salmonella* decreases from \$3.7 billion to \$2.4 billion, when adjusted for age at the time of death, because over two-thirds of the deaths from salmonellosis occur in people over 65. On the other hand, adjusting foodborne ill-

ness costs for *E. coli* O157:H7 by age at time of death increases the estimates by \$68 million because most deaths occur in children under the age of 5.

ERS currently measures the productivity losses due to nonfatal foodborne illnesses by the value of foregone or lost wages, regardless of whether the lost wages involved a few days missed from work or a permanent disability that prevented an individual from returning to work. Using the value of lost wages for cases resulting in disability understates an individual's willingness to pay to avoid disability because it does not account for the value placed on avoiding pain and suffering.

The willingness-to-pay measure derived from labor market studies that ERS uses to value a premature death is not an appropriate measure of willingness to pay to avoid disability because it measures the higher wages paid to workers to accept a higher risk of premature death, not disability. Methods have been suggested to adjust willingness to pay to reduce the risk of premature death downward to estimate willingness to

ground beef until the meat is no longer pink.

However, more recent research has shown that color alone may not be a good indicator of the presence of potentially dangerous bacteria in hamburger. USDA research shows that as many as one out of four hamburgers turns brown in the middle before reaching a safe internal temperature. Consumers are now encouraged to use food thermometers to ensure that meat and poultry (including ground meats) reaches an internal temperature of 160° F. The campaign features a digital thermometer messenger called Thermy™ that proclaims, "It's safe to bite when the temperature is right!"

Food safety messages are also being incorporated in other food

and diet education efforts. In May 2000, USDA released the newest edition of *Dietary Guidelines for Americans* (see "Nutrition Policy in the 1990's" elsewhere in this issue). The 2000 edition of the *Dietary Guidelines* for the first time includes a message on food safety. One of the 10 guidelines says, "Keep food safe to eat," and repeats the message of the FightBAC!™ campaign to "Clean, Separate, Cook, and Chill." The food safety guideline concludes with the sensible message taught to many of us by our parents: "When in doubt, throw it out."

The developments in food safety policy during the last decade have helped the Nation make progress in the goal of ensuring the safest possible food supply. Changes in regulations governing food production and

responses by producers have helped control and reduce risks from microbial pathogens. New research and surveillance efforts have helped us better determine the extent of foodborne illness in the United States and the most important sources of food safety risks. Educational efforts have increased public awareness and enabled consumers to protect themselves from foodborne diseases. ERS will continue to assess the economic consequences of public and private efforts to increase the safety of our food supply.

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Estimated Annual Costs of Five Foodborne Pathogens Total \$6.9 Billion

Pathogen	Estimated annual foodborne illnesses ¹			Estimated annual foodborne illness costs ² \$ billion ³
	Cases	Hospitalizations	Deaths	
	Number			
<i>Campylobacter</i> spp.	1,963,141	10,539	99	1.2
<i>Salmonella</i> , nontyphoidal	1,341,873	15,608	553	2.4
<i>E. coli</i> O157:H7	62,458	1,843	52	.7
<i>E. coli</i> , non-O157 STEC	31,229	921	26	.3
<i>Listeria monocytogenes</i>	2,493	2,298	499	2.3
Total	3,401,194	31,209	1,229	6.9

¹From Centers for Disease Control and Prevention (see Mead et al., 1999).

²The total estimated costs include specific chronic complications in the case of *Campylobacter* (Guillain-Barré syndrome), *E. coli* O157:H7 (Hemolytic uremic syndrome), and *Listeria monocytogenes* (congenital and newborn infections resulting in chronic disability or impairment). Estimated costs for *Listeria monocytogenes* exclude less severe cases not requiring hospitalization.

³August 2000 dollars.

Source: USDA's Economic Research Service.

pay to avoid disability, but there is no consensus among economists. ERS' conservative estimates of the annual costs due to foodborne illnesses (particularly the chronic conditions associated with *Campylobacter*) would be substantially increased if willingness to pay to avoid disability, pain, and suffering were also taken into account.

As these new estimates of foodborne illness costs are based on new data and improved methodologies for valuing these costs, the estimates presented here are not directly comparable to earlier ERS estimates of the costs of foodborne disease. In addition, because the underlying data are for a single year, the new cost estimates should not be used to infer whether these costs are decreasing or

increasing over time. ERS will continue to update and refine these cost estimates. Research is also underway to estimate the costs of arthritis caused by exposure to foodborne pathogens.

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For more information, go to:

<http://www.usda.ers.gov/emphases/SafeFood—ERS's website>.

<http://www.foodsafety.gov>—Information about food safety from several U.S. government agencies.

<http://www.usda.gov/fsis>—Information about food safety from USDA's Food Safety and Inspection Service.

<http://www.fightbac.org>—Information about the Fight BAC!™ campaign.

<http://www.csfan.fda.gov>—Information from FDA's Center for Food Safety and Applied Nutrition. ■

Recent Reports from USDA's Economic Research Service

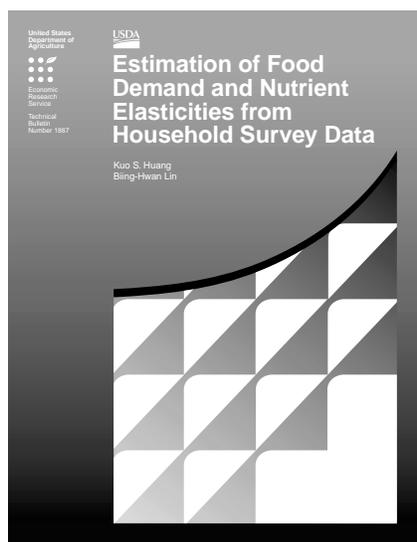
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Free electronic copies may be found at USDA's Economic Research Service (ERS) website: <<http://www.ers.usda.gov>>. Most reports are available electronically.

Food Consumption and Nutrition

Estimation of Food Demand and Nutrient Elasticities from Household Survey Data, by Kuo S.

Huang and Biing-Hwan Lin. Technical Bulletin 1887, August 2000, Stock # ERS-TB-1887. A methodology for estimating a demand system from household survey data is developed and applied to the 1987-88 Nationwide Food Consumption Survey data. The empirical results are sets of estimated demand elasticities for households segmented with different income levels. These demand elasticities are used to estimate the implied nutrient elasticities for low-income households. The estimation results are useful in evaluating some



food policy and program effects related to households of a specific income level.

Changes in Nutritional Quality of Food Product Offerings and Purchases: A Case Study in the Mid-1990's, by Eliza M. Mojduszka, Julie A. Caswell, Dennis B. West, and J. Michael Harris. Technical Bulletin 1880, January 2000, Stock # ERS-TB-1880. This report provides a new economic approach and methodology for analyzing nutritional quality change in manufacturers' food product offerings and food products purchased using a case study of five food product categories in the mid-1990's. Two approaches were used to analyze nutritional quality change in product offerings. The

first approach uses a composite nutritional index to measure changes. A second approach, nutrient-by-nutrient analysis, was also used to measure quality change. Overall, the nutrition index analysis showed no significant change in the average nutritional quality of products offered for sale in the five categories.

Maternal Nutrition Knowledge and Children's Diet Quality and Nutrient Intakes, by James R. Blaylock, Jayachandran N. Variyam, and Biing-Hwan Lin. Food Assistance and Nutrition Research Report 1, November 1999, Stock # ERS-FANRR-1. This report presents significant evidence that the more a mother knows about health and nutrition the better is the overall quality of her children's diet, for preschoolers more so than older children, and that a mother's years of schooling, smoking status, race, and ethnicity influence her children's diet. Results imply that health and nutrition education may be more effective if targeted toward mothers with young children but directly toward school-age children. Overall diet quality was assessed using the Healthy Eating Index, USDA's instrument for measuring overall diet quality incorporating 10 recommended nutritional guidelines.

Food Costs and Prices

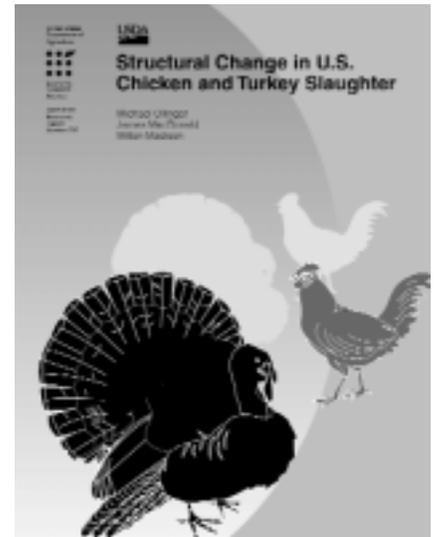
How Do Taxes Affect Food Markets? by Patrick Canning and Marinos Tsigas. Agriculture Information Bulletin 747-04, September 2000, Stock # ERS-AIB-747-04. Several food market indicators would change if a flat income tax system—that is, a system without exemptions, deductions, credits, and deferrals—replaced the current system. ERS analyses support the widely held view that even though a flat income tax system would increase national income, gains for consumers would be only modest. Nor would economic growth be universal. A Federal flat tax structure would lead to smaller farm industries with lower than average growth rates, larger food industries with higher than average growth rates, slightly lower food production costs and consumer food prices, reduced net farm exports, and reduced net food imports. If States were to enact similar reforms, consumer food prices would drop 2.2 percent overall and over 5 percent in the Delta, Appalachian, and Southern Plains regions.

Retail Food Price Forecasting at ERS: The Process, Methodology, and Performance from 1984 to 1997, by Frederick L. Joutz, Robert P. Trost, Charles Hallahan, Annette Clauson, and Mark Denbaly. Technical Bulletin 1885, May 2000, Stock # ERS-TB-1885. Forecasting retail food prices has become increasingly important to USDA due to the changing structure of food and agricultural economies and the important signals the forecasts provide to farmers, processors, wholesalers, consumers, and policymakers. It is unclear how these structural changes will affect the cyclical variation of food price markups and translate into changes in retail food prices. ERS is the only Federal Government entity that systematically examines food prices and provides

food price forecasts (on an annual basis). This report explains ERS' procedures in forecasting food prices and assesses how changes in the current procedures would improve the quality of the forecasts.

How Much Would Increasing the Minimum Wage Affect Food Prices? by Chinkook Lee, Gerald Schluter, and Brian O'Roark. Agriculture Information Bulletin 747-03, May 2000, Stock # ERS-AIB-747-03. Will increasing the minimum wage increase food prices as well? This study shows that a simulated \$0.50 increase in the minimum wage, if entirely passed on to consumers, would have increased food prices by less than 1 percent for most of the foods at foodstores and by 1 percent at eating and drinking places. Because these estimates were simulated using an economic model that assumed that firms did not alter their production processes when faced with higher minimum wages, these estimates are likely "upward bounds" of the price effects of a minimum wage increase.

Forecasting Consumer Price Indexes for Food: A Demand Model Approach, by Kuo S. Huang. Technical Bulletin 1883, February 2000, Stock # ERS-TB-1883. Forecasting food prices is an important component of USDA's short-term outlook and long-term baseline forecasting activities. A food price forecasting model is developed by applying an inverse demand system, in which prices are functions of quantities of food use and income. Therefore, these quantity and income variables can be used as explanatory variables for food price changes. The empirical model provides an effective instrument for forecasting consumer price indexes of 16 food categories.



Food Marketing

Structural Change in U.S. Chicken and Turkey Slaughter, by Michael Ollinger, James MacDonald, and Milton Madison. Agricultural Economic Report 787, September 2000, Stock # ERS-AER-787. Cost function analyses using data from the U.S. Bureau of the Census reveal substantial scale economies in chicken and turkey slaughter. These economies show no evidence of diminishing as plant size increases, are much greater than those realized in cattle and hog slaughter, and have resulted in a huge increase in plant size over the 1972-92 period. The findings also suggest that consolidation in the chicken and turkey slaughter industry is likely to continue, particularly if the growth in demand for poultry diminishes.

Understanding the Dynamics of Produce Markets: Consumption and Consolidation Grow, by Phil R. Kaufman, Charles R. Handy, Edward W. McLaughlin, Kristen Park, and Geoffrey M. Green. Agriculture Information Bulletin 758, August 2000, Stock # ERS-AIB-758. Mergers, acquisitions, and internal growth among grocery retailers, largely since 1996, have increased the share of grocery store sales accounted for by the largest 4, 8,



and 20 food retailers nationwide. Similar consolidation is occurring among food wholesalers. At the same time, new packaged and branded produce items are gaining acceptance with consumers and vying for shelf space in the supermarket produce department. Growers, shippers, and their trade associations fear the possibility of fewer buyers for their products, particularly if new marketing and trade practices such as volume incentive rebates and slotting fees become widespread. This report uses data from the Censuses of Wholesale Trade and Retail Trade and industry sources to examine changes in produce markets and market channels from 1987 to 1997 in the United States.

Consolidation in U.S. Meatpacking, by James M. MacDonald, Michael E. Ollinger, Kenneth E. Nelson, and Charles R. Handy. Agricultural Economic Report 785, February 2000, Stock # ERS-AER-785. Meatpacking consolidated rapidly in the last two decades: slaughter plants became much larger, and concentration increased as smaller firms left the industry. Establishment-based data from the U.S. Census Bureau is used to describe consolidation and to identify the roles of scale economies and technological

change in driving consolidation. Through the 1970's, larger plants paid higher wages, generating a pecuniary scale diseconomy that largely offset the cost advantages that technological scale economies offered large plants. The larger plants' wage premium disappeared in the 1980's, and technological change created larger and more extensive technological scale economies. As a result, large plants realized growing cost advantages over smaller plants, and production shifted to larger plants.

Structural Change and Competition in Seven U.S. Food Markets, by A. J. Reed and J. S. Clark. Technical Bulletin 1881, February 2000. Stock # ERS-TB-1881. Recent trends in mergers and acquisitions in the U.S. food sector—food manufacturers, wholesalers, and retailers—raise concerns about market power. In the presence of market power, farmers may receive lower than competitive farm prices, and consumers may pay higher than competitive retail prices. This study presents empirical tests of market power at the national level for seven food categories: beef, pork, poultry, eggs, dairy, fresh fruit, and fresh vegetables. At the national level, our tests provide evidence of competitive conduct in both the sale of final food products and the purchase of farm ingredients.



Price and Quality of Pork and Broiler Products: What's the Role of Vertical Coordination? by Steve W. Martinez. Agriculture Information Bulletin 747-02, February 2000, Stock # ERS-AIB-747-02. Significant changes in vertical coordination of the U.S. broiler industry many years ago may provide useful insight into the rapid changes occurring in today's pork industry. Under production contracts and vertical integration, the broiler industry developed and grew into the leader in U.S. meat production—outpacing beef and pork. Production efficiencies, quality assurances, and convenience in product offerings have led to falling chicken prices and rising per capita consumption. Incentives for contracting in the pork industry are similar to those in the broiler industry in many ways. The similarities suggest that consumers may also expect plentiful supplies of high-quality pork products at economical prices.

Food Assistance

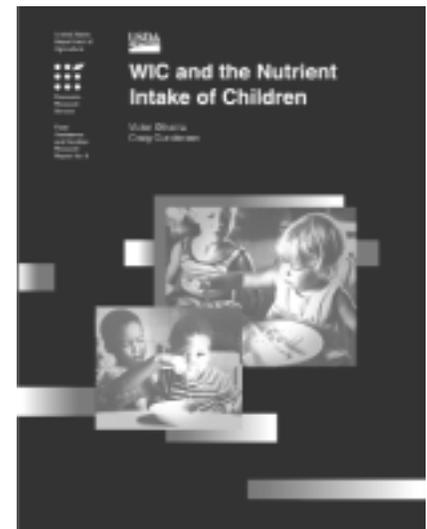
The Effect on Dietary Quality of Participation in the Food Stamp and WIC Programs, by Parke E. Wilde, Paul E. McNamara, and Christine K. Ranney. Food Assistance and Nutrition Research Report 9, September 2000, Stock # ERS-FANRR-9. Participants in the Food Stamp Program consume more meats, added sugars, and total fats than they would in the absence of the program, while their consumption of fruits, vegetables, grains, and dairy products stays about the same. Participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) consume significantly less added sugars, which may reflect the substitution of WIC-supplied juices and cereals in place of higher sugar soft drinks and cereals. These findings come from a study of low-income Americans using the Continuing Survey of Food Intake by Individuals.

Household Food Security in the United States, 1999, by Margaret Andrews, Mark Nord, Gary Bickel, and Steven Carlson. Food Assistance and Nutrition Research Report 8, Fall 2000, Stock # ERS-FANRR-8. Preliminary estimates indicate that 89.9 percent of American households were food secure in 1999, up 0.6 percentage point from 1995. Some 31 million Americans were food insecure—they did not have assured access at all times to enough food for an active, healthy life. In 3 percent of all households, one or more household members were hungry, at least some time during the year, because of inadequate resources. Between 1995 and 1999, the number of food-insecure households fell by 12 percent, and the number with hunger due to inadequate resources fell by 24 percent. Households with incomes between 50 and 130 percent of the poverty line were the only household types among the 30 subgroups studied to show a higher rate of food insecurity in 1999 than in 1995.

A Comparison of Food Assistance Programs in Mexico and the United States, by Craig Gundersen, Mara Yañez, Constanza Valdez, and Betsey Kuhn. Food Assistance and Nutrition Research Report 6, July 2000, Stock #ERS-FANRR-6. The social safety nets in Mexico and the United States rely heavily on food assistance programs to ensure food security and access to safe and nutritious foods. Mexico uses geographic and household targeting to distribute benefits to low-income households and/or individuals, while the United States uses only household targeting. U.S. food assistance programs tend to be counter-cyclical (as the economy expands, food assistance expenditures decline and vice versa). Mexican food assistance programs appear to be neither counter- nor procyclical. Food assistance programs have little effect on the extent of poverty in Mexico,

while the opposite is true in the United States, primarily because the level of benefits as a percentage of income is much lower in Mexico and a much higher percentage of eligible households receive food assistance benefits in the United States.

The Decline in Food Stamp Program Participation in the 1990's, by Parke Wilde, Peggy Cook, Craig Gundersen, Mark Nord, and Laura Tiehen. Food Assistance and Nutrition Research Report 7, June 2000, Stock # ERS-FANRR-7. The Food Stamp Program saw an unprecedented decline in participation, from 27.5 million participants in 1994 to 18.2 million participants in 1999. A strong economy and changes in social welfare programs drove this change. An econometric model with State-level data calculated that 35 percent of the caseload decline from 1994 to 1998 was associated with changing economic conditions and 12 percent with program reform and political variables. Using household-level data from the Current Population Survey, 28 percent of the total change in participation was associated with a decrease in the number of people with low income (below 130 percent of the poverty line) and 55 percent was due to a decline in the proportion of low-income people who participate.

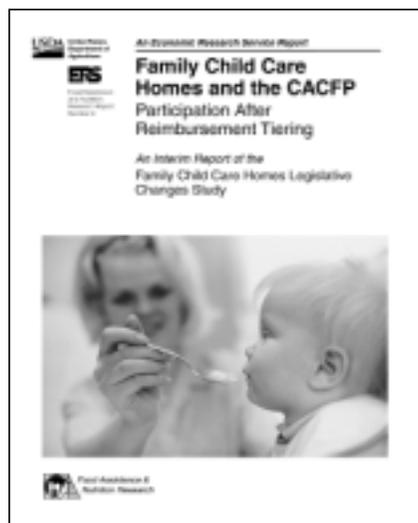


WIC and the Nutrient Intake of Children, by Victor Oliveira and Craig Gundersen. Food Assistance and Nutrition Research Report 5, March 2000, Stock # ERS-FANRR-5. After controlling for self-selection bias, participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has a significant positive effect on children's intakes of iron, folate, and vitamin B-6. Iron is one of five nutrients targeted by the program, the others being protein, calcium, vitamin A, and vitamin C. Folate and vitamin B-6, along with zinc, were recommended by a 1991 USDA study as nutrients that the program should also target. The data set used, the 1994-96 Continuing Survey of Food Intake by Individuals, reflects the dramatic increase during the 1990's in the number of children in the program.

Increasing Food Recovery From Farmers' Markets: A Preliminary Analysis, by Charlene C. Price and J. Michael Harris. Food Assistance and Nutrition Research Report 4, January 2000, Stock # ERS-FANRR-4. Collecting unsold food discarded at farmers' markets has the potential to allow nonprofit food recovery and gleaning organizations to distribute significant quantities of wholesome, unsold fruits and vegetables to needy families. Donations

of this unsold produce by the participants at these markets can generate tangible benefits: increased private food assistance and better nutrition for lower income families. The Geographical Information System (GIS) analysis presented in this study indicates the potential to strengthen the links between farmers' markets and nonprofit food recovery and gleaning organizations in many areas of the United States.

Family Child Care Homes and the CACFP: Participation After Reimbursement Tiering (An Interim Report of the Family Child Care Homes Legislative Changes Study), by William L. Hamilton, Eric Stickney, and Mary Kay Crepinsek. Food Assistance and Nutrition Research Report 3, November 1999, Stock # ERS-FANRR-3. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 established a two-tier structure of meal reimbursement rates for family child care homes participating in USDA's Child and Adult Care Food Program (CACFP) and mandated a study of the effects of that change on program participation and State licensing of child care homes. Using administrative data, this interim report finds that participation in CACFP by child care homes



dropped 6 percent and the number of sponsoring organizations that administer the participating child care homes dropped 2 percent between 1997 and 1998.

Food Safety

Economics of Food Labeling, by Elise Golan, Fred Kuchler, and Lorraine Mitchell with contributions from Cathy Greene and Amber Jesup, Agricultural Economic Report No. 793, December 2000, Stock # ERS-AER-793. Federal intervention in food labeling is often proposed with the aim of achieving a social goal such as improving human health and safety, mitigating environmental hazards, averting international trade disputes, or supporting domestic agricultural and food manufacturing industries. Economic theory suggests, however, that mandatory food-labeling requirements are best suited to alleviating problems of asymmetric information and are rarely effective in redressing environmental or other spillovers associated with food production and consumption. Theory also suggests that the appropriate role for government in labeling depends on the type of information involved and the level and distribution of the costs and benefits of providing that information. This report traces the economic theory behind food labeling and presents three case studies in which the government has intervened in labeling and two examples in which government intervention has been proposed.

Tracing the Costs and Benefits of Improvements in Food Safety: The Case of the Hazard Analysis and Critical Control Point Program for Meat and Poultry, by Elise H. Golan, Stephen J. Vogel, Paul D. Frenzen, and Katherine L. Ralson, Agricultural Economic Report 791, October 2000, Stock # ERS-AER-791. The level and distribution of the

costs and benefits of the Hazard Analysis and Critical Control Point (HACCP) regulatory program for meat and poultry change dramatically once economywide effects are included in the analysis. Using a social accounting matrix model, the authors find that reduced premature deaths had a strong positive effect on household income, with economywide benefits almost double initial benefits. Contrary to expectations, reduced medical expenses resulted in a decrease in household income, while HACCP costs resulted in an increase. Net economywide benefits were slightly larger than initial net benefits, with poor households receiving a proportionally smaller share of the increased benefits than nonpoor because of their weak ties to the economy.

Consumer Acceptance of Irradiated Meat and Poultry Products, by Paul D. Frenzen, Alex Majchrowicz, Jean C. Buzby, Beth Imhoff, and the FoodNet Working Group. Agriculture Information Bulletin 757, August 2000, Stock # ERS-AIB-757. The Federal Government began allowing food manufacturers to irradiate raw meat and meat products to control pathogenic microorganisms in February 2000. Consumer acceptance of irradiated foods could affect public health because many foodborne illnesses occur when consumers handle or eat meat or poultry contaminated by microbial pathogens. However, food manufacturers have been slow to adopt irradiation, partly because of the perception that relatively few consumers are willing to buy irradiated foods. A recent survey by the Foodborne Diseases Active Surveillance Network (FoodNet) confirmed this perception: only half of the adult residents of the FoodNet sites were willing to buy irradiated ground beef or chicken, and only a fourth were willing to pay a premium for

these products, which cost more to produce than comparable nonirradiated products. These findings suggest that the impact of food irradiation on public health will be limited unless consumer preferences change.

Assigning Values to Life: Comparing Methods for Valuing Health Risks, by Fred Kuchler and Elise Golan. Agricultural Economic Report 784, December 1999, Stock # ERS-AER-784. This report examines five approaches economists and health policy analysts have developed to evaluate policy affecting health and safety: cost-of-illness, willingness-to-pay, cost-effectiveness analysis, risk-risk analysis, and health-health analysis. The authors examine the theoretical basis and empirical application of each approach and investigate the influence that underlying assumptions in each approach have on policy guidance. Regulatory agencies now commonly use the willingness-to-pay approach to estimate health and safety benefits, but they assume away the importance of individual

preferences. The authors build on four principal conclusions to suggest the appropriate use of each approach.

International Marketing Trends

Food Security Assessment Situation and Outlook, by Shahla Shapouri and Stacey Rosen. Global Food Assessment 12, December 2000, Stock # ERS-GFA-12. ERS projects that average per capita food consumption for 67 low-income countries will increase in the next decade. ERS also projects that the number of people failing to meet their nutritional requirements will decline from 774 million in 2000 to 694 million in 2010, providing an improved outlook for global food security. But the gains are not uniform across countries and in many, food insecurity will probably intensify. Sub-Saharan Africa, as the most vulnerable region, accounts for only 24 percent of the population of these 67 countries, but it is projected to account for 63 percent of these "hungry" people in 2010. HIV/AIDS

is expected to reduce the region's agricultural productivity, and constraints in financial resources will limit commercial imports, thus leading to declining per capita consumption.

Food Security Assessment Situation and Outlook, by Shahla Shapouri and Stacey Rosen. Global Food Assessment 11, December 1999, Stock # ERS-GFA-11. In 1999, the food gap to maintain per capita consumption at 1996-98 levels in 67 low-income developing countries is estimated at nearly 13 million tons, about 2 million tons more than estimates for 1998. Around 400,000 tons of the increase arose from adding a new country, North Korea, to the analysis this year. The gap to meet minimum nutritional requirements is estimated to be higher at 15 million tons. During the next decade, the food gaps for both consumption targets are projected to widen. Food consumption is projected to fall short of the nutritional requirement in 30 countries, while 44 countries are expected to face a decline in per capita consumption in 2009. ■



Larger sample, more nutrients!

USDA's Agricultural Research Service has released data from the 1998 Continuing Survey of Food Intakes by Individuals (CSFII) in combination with the 1994-96 CSFII and Diet and Health Knowledge Survey (DHKS). The data are available on CD-ROM for \$90 (accession number PB2000-50027) from the National Technical Information Service at 1-800-553-6847 (outside the U.S., 703-605-6000). The CD-ROM includes complete data, all the documentation needed for using the data, and SAS programs to read the data and create system files.

The CSFII 1998 adds 5,559 children birth through 9 years of age to 4,253 children of the same age in the CSFII 1994-96. The CSFII 1994-96, 1998 combined data set includes information on food and nutrient intakes for more than 20,000 individuals of all ages who provided 2 days of dietary data. A subset of nearly 6,000 CSFII participants 20 years of age and over provided information on knowledge and attitudes toward dietary guidance and health.

Technical databases used in processing the survey are also on the CD-ROM, including codes for over 7,000 foods and data on energy and 51 dietary components. Selenium, caffeine, and theobromine have been added to the Survey Nutrient Database. For more information about the CD-ROM, visit our web site:

<http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>

Food Surveys Research Group; USDA/ARS/BA/BHNRC;
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